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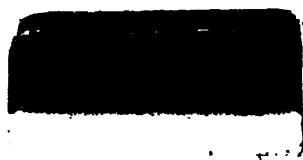
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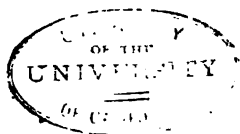
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PREFACE TO NINETEENTH EDITION.

THE first edition of the "Fruit Culturist," the basis of the present work, was written more than thirty years ago, and a year before the appearance of Downing's first edition of the "Fruits and Fruit-Trees of America." It was subsequently much enlarged through several revised editions. The rapid progress made of late years in the culture of fruit has required a still further revision, and the work is now brought down to the present date. Being intended as a guide to the practical cultivator, its object is to furnish useful directions in the management of the nursery, fruit-garden, and orchard, and to assist in the selection of the best varieties for cultivation. It aims to give full descriptions only of valuable and promising fruits suited to the country at large, or which may have been popular in certain districts. Many sorts, however, which are less known, or whose position or value is undetermined, and several excellent new varieties, will be found noticed in the general "Descriptive List and Index," where their leading characteristics are briefly described.

As some confusion would result from a promiscuous assemblage of all the different varieties, a systematic classification has been adopted for the principal fruits. By placing them under separate and characteristic heads, the cultivator is enabled to distinguish and remember each sort with more readiness than where all are thrown indiscriminately together. The names of those varieties which have been proved of the greatest general value, or which have received a large vote in their favor, either in particular regions or throughout the country, are distinguished by being printed in small capitals.* One of the chief points for determining the classification is the time of ripening; and the principal fruits are separated

* In this edition by an asterisk following the name. [EDITOR.]

into summer, autumn, and winter sorts. Although the periods of ripening vary several weeks in different parts of the country, these divisions of time will be sufficiently exact for general purposes.

The distinguishing characteristics of this work are the following: 1. The arrangement of the chapters. 2. The systematic classification of most of the large fruits, and more especially of the apples and pears. 3. The condensed descriptions of fruits, which have been mostly taken from the ripened specimens. 4. The copious illustrations of the various operations.

The reader will understand the comprehensive character of the "Descriptive List and Index" by referring to the note at its head.

JOHN J. THOMAS.

EDITOR'S PREFACE TO TWENTIETH EDITION.

IN presenting the present edition of "Thomas' American Fruit Culturist," it seems necessary briefly to state the reasons for the numerous changes which will be found, and also to offer an apology for whatever shortcomings may be noticed. Mr. Thomas was my lifelong friend, and, when the infirmities of his later years prevented him from making the needed revision himself, he requested that I should personally undertake it. Though the cares and responsibilities of an active business life seemed to forbid so arduous a task, congenial as it was to an amateur for thirty years in horticultural work, nevertheless, the great value of the book, and its probable continued usefulness to all interested in fruit-culture in America, were so apparent, that I consented to undertake it under Mr. Thomas' supervision. Unfortunately, almost before it was begun his death deprived me of the support upon which I had so greatly calculated. The work has, therefore, been completed under disadvantages which those only who personally knew its gifted author can appreciate.

John J. Thomas, the son of David Thomas, the chief engineer in building the Erie Canal from Rochester to Buffalo, was born at Ledyard, Cayuga County, N. Y., January 8th, 1810. He was chiefly educated at home, and early developed an intense interest in natural science, especially devoting himself to botanical study. After some years spent with his father in the nursery business, he established a nursery of his own in Wayne County, and for over thirty years continued in the business, earning a reputation which placed him in the front rank as a practical pomologist and authority in everything pertaining to the propagation and raising of fruits of all kinds. He was an industrious writer, both of books and as contributor to journals. He was an associate editor of the *Country Gentleman*, from its foundation until 1894, when failing strength

prevented him from continuing his connection with that paper. On February 22d, 1895, he died. Mr. E. W. Lincoln, secretary of the Worcester County (Mass.) Horticultural Society, wrote of him: He "was ever the peer of Barry and the Downings, and survived them to take his proper place, unchallenged, at the very head of the pomologists of America."

The changes which have been made in this edition of Thomas' work are such only as seemed to confine its matter strictly to the propagation and cultivation of fruits in the open air, and to bring it in all respects fully up with our present knowledge. The few sections which treated of raising or ripening under glass, of preserving fruit, and the lists of such as could be grown only in houses, have been omitted. The selected list of fruits recommended for different parts of the United States has also been omitted, because now the agricultural experiment stations of each State afford a more reliable guide. The "Monthly Calendar of Work" has been dropped, on account of its unsuitableness for every locality.

The cultivation of fruit in California and the Pacific States is not especially treated of, there being already a voluminous work upon this subject.

On the other hand, numerous chapters have been added upon subjects which have become of practical value and of almost vital importance to the would-be successful fruit-grower.

The chapter on "Insects and Diseases" has been greatly extended, the investigations of the past ten years having added much to our knowledge upon these important topics.

The second section of the book, treating of the varieties of the "Different Kinds of Fruits," has been very thoroughly revised, and it is believed will be found to embrace practically complete descriptions of all the acknowledged standard and approved newer sorts; while the "Descriptive Index," as heretofore, includes also very many kinds now nearly or quite superseded, and others which have been so recently introduced that their real value is not yet established.

An entirely new chapter has been added on "Nuts."

The new chapter on "Wild Fruits" closes this section.

The third section has been expressly prepared for this work by Mr. E. H. Hart, of Florida, upon the recommendation of Mr.

P. J. Berckmans, of Augusta, Ga., the veteran and learned president of the American Pomological Society. It covers all the sub-tropical fruits which can be successfully cultivated, save, perhaps, in the limited extreme southern part of Florida.

One of the most unsatisfactory points in connection with illustrations of fruits, wherever found, is the uncertainty as to the actual size of the variety represented, while it is pretty generally understood that the engravings in nurserymen's catalogues are usually of abnormally large specimens, and too often, especially with the smaller fruits, the same cut is made to do duty in different lists for several sorts.

In this work all illustrations of fruit are from average-sized specimens, and are life-size, unless otherwise definitely stated.

The importance of this feature in identifying varieties has been considered so great that, in certain chapters, as, for instance, that upon "Grapes" and that on "Strawberries," illustrations have been wholly omitted, from the impossibility of obtaining photographs in the time allowed me by the publishers. In future editions, it is hoped these and other omissions in the same line may be supplied.

I am indebted to Prof. L. H. Bailey, of the Cornell State Experiment Station, Ithaca, N. Y., for the chapter on "Spraying;" to Prof. J. L. Budd, of the State Experiment Station at Ames, Iowa, for descriptions of Russian apples, incorporated in the chapter on that fruit; to Mr. E. H. Hart, of Federal Point, Fla., for the entire section on "Sub-Tropical Fruits;" to the Directors of all the experiment stations of the country for their courtesy in sending me, as far as possible, complete files of their publications, of which I have made copious use, especially in the way of illustrations.

For kind permission to copy wood-cuts, I have also to thank Prof. C. C. Georgeson, of Manhattan, Kan.; and William Parry, of Parry, N. J.

I must also acknowledge my indebtedness to Mr. S. B. Heiges, pomologist of the Department of Agriculture, Washington, D. C., for courtesies received.

WILLIAM H. S. WOOD.

NEW YORK, JANUARY 2d, 1897.

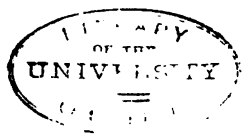


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THE AMERICAN FRUIT CULTURIST.

CHAPTER I.

LEADING PRINCIPLES OF THE GROWTH OF TREES.

THE formation of a large tree from a minute seed is one of the most interesting and wonderful occurrences in nature. It is important that the fruit culturist should so understand the process as to know what will hasten it on one hand or retard it on the other. By understanding these principles, the necessary rules will be greatly simplified, and the directions rendered more clear and obvious.

GERMINATION.

The first movement of the seed towards forming a new plant is termed *germination*. After the plant is formed, and its growth is carried on through the agency of its leaves, the process is termed *vegetation*; the latter immediately following the former.

To produce germination seeds require heat, moisture, and air, but not light. It will be observed that these three requisites are present when seeds are slightly buried in moist, warm, mellow earth. Heat, although essential to all seeds, varies in the degree required by different species. The chickweed, for instance, will vegetate nearly down to the freezing-point; while tropical or hot-house plants often need a blood heat. Nearly every person has seen proofs of the necessity of moisture for the germination of seeds—indicated by the practice of watering newly-sown beds. The florist is aware that

minute seed, which cannot be planted deep, as the portulacca, must be kept moist by a thin covering or shading. It is often requisite to bury seeds to a considerable depth, in order to secure a proper degree of moisture to start them. On the other hand, they will sprout on the surface unburied, if kept constantly showered.

The third requisite, *air*, is an important one. Seeds may be kept dormant a long time by deep burying. Nurserymen have often retained the vitality of peach-stones for a year or two, by burying them a foot or more in compact earth. Other seed might doubtless be kept for a time in the same way. Planting too deep is often fatal to the success of a crop. The seeds of noxious weeds remain many years buried beneath the soil, until cultivation brings them up, mixes them with the soft mellow surface, accessible to air, when they spring up in profusion over the ground.

As a general rule, seeds germinate and grow most readily when buried to a depth of from three to five times their diameter, in soils of ordinary moisture.

In order to produce germination, moisture must find ready access to the interior of the seed. It is often excluded, if the coats have been allowed to become too dry. The thick coverings of the chestnut, horse-chestnut, and many seeds of similar character, if left a few days exposed to the air, become so hard as to prevent it. To secure success, they must be kept moist by imbedding them in moist sand, leaf-mould, or moss, from the moment they separate from the tree until planted in the earth. Apple seeds and some others, which have been allowed to become too dry, may frequently be started by scalding and then exposing them to the action of the frost; and by repeating the process several times, there is greater certainty of germinating. As the scalding and cooling must be quickly done, portions not larger than two or three pounds should be taken at a time. The object in cracking peach and plum-stones before planting, is to admit air and moisture—a process which is also hastened by subjecting them to freezing and thawing.

The Structure of the Plant or Tree.—All plants, in the first place, are manufactured or built up of innumerable little cells, sacs, or cavities. These are usually not over a five-

hundredth part of an inch in diameter, and in many plants they are still smaller. Fig. 1 exhibits a section of the wood of the maple cut across—presenting many thousands of these little vessels, only visible under a good microscope. The branch of an apple-tree, an inch in diameter, cut across, shows about one million. This cellular structure exists throughout the roots, stems, shoots, leaves, flowers, and fruit.

The cells of plants usually vary from 1-300th to 1-500th of an inch in diameter, and it is obvious that during vigorous growth the plant forms them with great rapidity. A shoot of

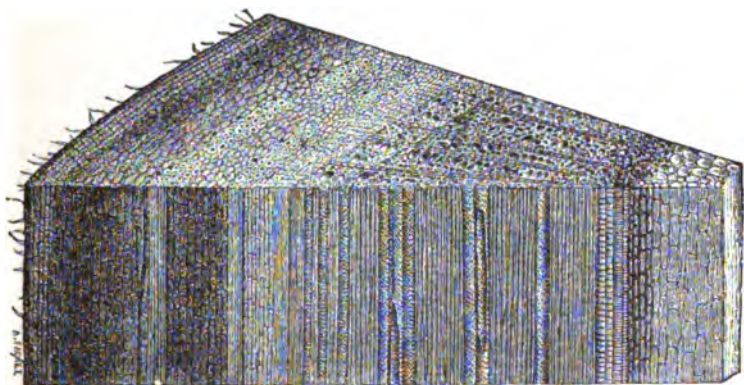


FIG. 1.—Cross Section of Tree Trunk.

asparagus increases the length of one cell every ten seconds; and as its diameter embraces many thousands, from fifty to a hundred million are formed every day. The building up of the plant of these cells has been compared to the erection of a house by the successive addition of bricks; but if as many bricks were daily added to a structure, they would be enough to make a building daily larger than the great pyramid of Egypt, or the Coliseum at Rome. Yet every one of these cells is as perfect and finished as the finest work of art.

THE ROOT.

The root consists of several parts (Fig. 2). The *main* root, called also the *tap* root, is the large central portion, extending downward. In many plants or trees, however, it is

divided as growth advances, until lost in *laterals* or side branches. The *fibres* or *rootlets* are the small thread-like roots proceeding from the laterals; and lastly, the smallest of all, the new fibres are furnished with *root-hairs*, scarcely visi-

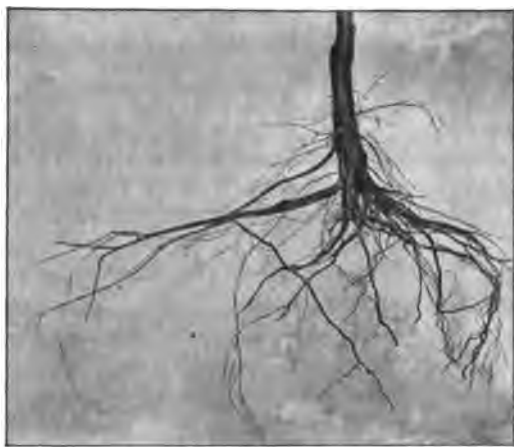


Fig. 2.—Root System of Two-year-old Apple.

ble without a microscope. The whole surface of roots continue to absorb moisture from the soil so long as they are fresh and new; and the newer portions, near the tips, absorb most freely. Old roots, covered with a hard or hor-

ny bark, imbibe almost none. The root-hairs convey moisture into the fibres with rapidity. Young trees, when dug up for transplanting, have most of the fibres and root-hairs torn from them, and they would suffer serious injury or die, but for the power which they possess of rapidly reproducing them under favorable influences.

The *collar* is the point of union between the root and the stem, but its place may be easily changed in many young plants by banking up the stem, which will emit new roots above. Or, a branch may be buried, as in layering grapevines, honeysuckles, gooseberries, and many other woody plants. Small portions of roots attached to a graft will often produce a new plant; this is especially the case with the grape and rose, which are extensively propagated in this way; and also in some degree with the apple, of which, however, when thus root-grafted, larger portions should be employed of the roots of one-year, or at most two-year, seedlings.

THE STEM AND BRANCHES.

As roots are *annual*, *biennial*, or *perennial*, as they continue living *one*, *two*, or more *seasons*; so the stem is *herbaceous* or *woody*, as it grows only one year or more—in the latter instance hardening into wood. Woody plants, when small, are called *shrubs*, as the rose, gooseberry, and currant. When large, they are trees, as the apple, pine, and oak. A dwarf apple, made small by budding any common variety on the small Paradise stock, becomes a shrub. *Suckers* are branches springing up from underground stems; some times they come from mutilated roots. Runners are creeping stems, which strike roots at the tips and form leaves there, as in the strawberry. A single strawberry plant will in this way produce a hundred new ones or more in a summer; and by care ten thousand by the end of the second year, a million the third, and so on.

Stated in general terms the stems or trunks of hard wood trees (dicotyledons) are formed of bark, cambium layer, wood, and pith. The outer bark on some trees gradually forms into a thick, hard, corky substance, termed *cortical layers*, but while young it is the *green bark* of growing shoots. The inner layer of bark, next the cambium, is called the bast layer or *liber*, from the resemblance of the concentric plates of which it is formed to the leaves of a book.

The *cambium* layer is the active, cellular agent in the growth of the tree; through it the sap more freely circulates. From its inner surface is produced the growth of wood, and from its outer the bark is formed. Thus the newest bark is inside, and the newest wood outside.

Wood.—The outer wood, which is the youngest and freshest, is called the alburnum or sap-wood. The heart-wood is the older, harder, and usually more dried portion; and it bears the same relation to the sap-wood as the cortical layers do to the liber.

The *pith*, in young plants, performs a useful office by retaining moisture; but in old trees it becomes dry, shrivelled, and useless, and trees grow as well where it has been cut out.

Branches.—These consist of *main branches*, or limbs; *secondary* or smaller branches; and *shoots*, or the extremities, being one year's growth. *Thorns* are a modification of branches,

and are sometimes simple, as in the common thorn, or branched, as in the honey-locust. Ungrafted pear-trees often present all the intermediate forms between perfect branches and perfect thorns. *Prickles* grow only from the bark, and when the bark is stripped off they are all taken off with it; but thorns remain attached to the wood.

Buds are of two kinds, *leaf* and *flower*. The former grow into branches, the latter produce fruit. To distinguish these buds is of great importance to the cultivator of fruit-trees. Fig. 3 represents a portion of the branch of a pear-tree;

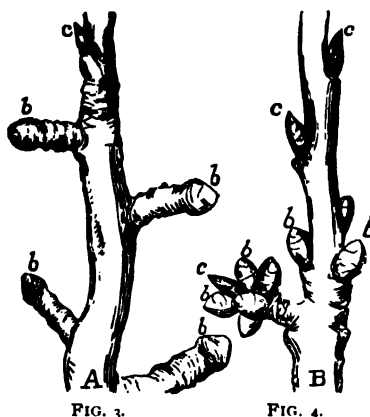


FIG. 3. Leaf and Flower Buds. *b, b*, Flower-buds; *c, c*, leaf-buds.

b, b, b are flower or fruit-buds on the extremities of short spurs termed fruit-spurs, and *c* is a leaf-bud on a one-year's shoot. Fig. 4 exhibits these two kinds of buds as seen on the cherry, *b, b*, being the round fruit-buds, and *c, c*, the sharper leaf-buds.

Causes of this Difference.—When young trees grow rapidly, all their buds are leaf-buds; when they become older and grow more feebly, many of them become flower or fruit buds.

One is the result of rapid and the other of slow growth. Check the growth of a young tree by transplanting it, or by root-pruning, or by neglecting cultivation, or allowing it to grow with grass, and many fruit-buds will be found upon it, and it will bear early. But as the growth is unnaturally enfeebled, the fruit is not always of the best quality. The natural diminution of vigor from increased age furnishes better fruit. Fruit-buds are likewise produced by checking the free flow of the sap in grafting on dissimilar stocks; as, for example, the pear on the quince, producing dwarf pear-trees. The fruit-spurs shown by *b*, Fig. 3, are nothing more than stunted shoots, originally produced from leaf-buds, but which, making little growth, have become fruit-bearers. The vigorous, one-year shoot of the cherry, Fig. 4, is mostly supplied with

leaf-buds, but the short spurs on the second year's wood, which are but dwarfed branches, are covered with fruit-buds, with only a leaf-bud in the centre.

It is not, however, always the slowest-growing kinds of fruit-trees that bear soonest. There appears to be a constitutional peculiarity, with different sorts, that controls the time of beginning to bear. The Bartlett, Julienne, and Howell pears, vigorous growers, bear much sooner than the Dix and Tyson, which are less vigorous.

By pruning away a part of the leaf-buds the fruitfulness of a tree may be increased; and by pruning away the fruit-spurs, bearing may be prevented, and more vigor thrown into the shoots.

Buds are *lateral*, when on the side of a shoot; and *terminal*, when on the end. Terminal buds are nearly always leaf-buds, and, usually being larger and stronger than others, make stronger shoots. All buds are originally formed as leaf-buds, but the more feeble are generally changed to fruit-buds. Now, it happens that on many kinds of trees the feebler buds are on the lower parts of shoots (by *lower* is meant furthest from the tip), and these consequently often change to fruit-buds. This change in some kinds of trees, as cherry and plum, takes place the year after they are formed; and in others the same year, as, for instance, in the peach and apricot. This transformation is a very curious process, and is effected by the embryo leaves changing to the organs of the flowers. A contrary change of stamens to flower-leaves produces double flowers.

Latent Buds.—Only a small proportion of all the buds formed grow the second year; the rest remain dormant or latent for years, and are made to grow and produce shoots only when the others are destroyed.

Adventitious Buds are produced by some trees irregularly anywhere on the surface of the wood, especially where it has been mutilated or injured; and they form on the roots of some trees which are cut or wounded. In these cases such trees may be usually propagated by cuttings of the roots.

Leaves.—These are commonly made up of two principal parts, viz., the *framework*, consisting of the leaf-stalk, ribs, and veins, for strengthening the leaf, and supplying it with sap; and the *green pulp*, which fills the meshes or interstices.

The whole is covered with a thin skin or *epidermis*. The green pulp consists of cells of various forms, with many air spaces between. The cells are commonly placed very compactly together on the upper side of the leaf, and more loosely, or with air-spaces, on the lower side—hence the reason that

leaves are usually lighter-colored below. Fig. 5 is a highly magnified section of a leaf, showing the green cells, air-spaces, and epidermis above and below. Leaves have also *breathing pores*, through which moisture and air are absorbed, and vapor given off. They are so small as to require a good microscope to discover them; and they vary in different plants from 1,000

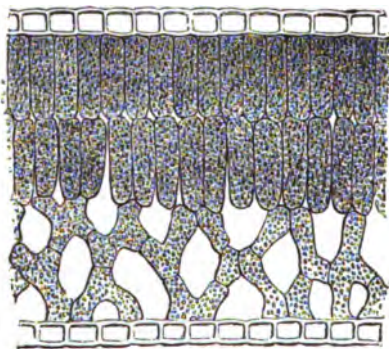


FIG. 5.

to 170,000 on a square inch of surface. The apple and pear have about 25,000 or 30,000, and the white lily about 60,000 to the square inch. They are mostly on the lower side of the leaf. Fig. 6 represents the pores on an apple-leaf. Leaves are a contrivance for increasing the surface exposed to the air and sun. Professor Gray says the Washington elm at Cambridge was estimated to bear "seven million leaves, exposing a surface of 200,000 square feet, or about five acres of foliage." A common fully grown apple-tree has from three to five hundred thousand leaves, and the breathing pores they all contain must be more than a thousand million.

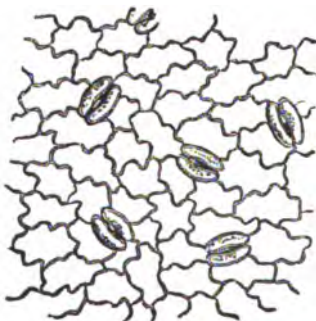


FIG. 6.

THE PROCESS OF GROWING.

Water is absorbed by the roots, and undergoes a very slight change; matter from the cells of the root is added (as sugar,

in the maple), and it is then denominated *sap*. It passes from cell to cell upward, through the sap-wood, until it reaches the leaves. The cells being separate, and not continuous tubes, it is conveyed from one to another through a great number of partitions; in the basswood, for example, which has very long cells, it passes about 2,000 partitions in rising a foot.

When the sap enters the leaf, it emerges from the dark cells through which it has been passing, and is spread out to the light of the sun. A large portion is evaporated through the breathing pores, and it becomes thickened. The carbonic acid of the air, and the small portion of the same acid which the sap contained before it entered the roots, now forms a combination with the oxygen and hydrogen of the sap, and produces the triple compound of oxygen, hydrogen, and carbon, which constitutes woody fibre—the oxygen of the carbonic acid escaping. This escape of oxygen may be seen by placing leaves under water in the sunshine. Innumerable little bubbles of oxygen form on the surface of the leaves, and give them a silvery appearance. If continued, air-bubbles rise in the water, and if a glass tumbler full of water is inverted over them, pure oxygen in small quantities may be procured. A plant growing in carbonic acid gas takes the carbon, and leaves the oxygen; in this way changing the acid to oxygen. Growing plants thus perform a most important office by purifying the atmosphere. Fires in burning, and animals in breathing, consume carbon, combine it with oxygen, and then throw off the carbonic acid thus formed. This acid, being poisonous, would after a while become so abundant as to prove injurious to animal life, were it not for the wise provision by which plants consume it and restore the oxygen. Connected with this, there is another interesting proof of creative design. If there were no carbonic acid in the air, plants could not grow; but one-twenty-five-hundredth part, as now exists, supplies food for vegetation, and does not affect the health of animals and man.

Leaves require sunlight to enable them thus to decompose carbonic acid. It does not go on in a dark room, or in the night. An excess of oxygen in a plant makes it pale in color, and either sour or insipid in taste; an excess of carbon makes

it dark-green, high-flavored, or bitter. Hence, a potato growing in a dark cellar is pale or white; hence the process of blanching celery and sea-kale to remove the bitter taste. Hence also the reason that a potato much exposed to the sun imbibes too much carbon, and becomes bitter. Hence, too, strawberries and other fruits are more acid when hidden by leaves or in cloudy weather; and apples on the thickly-shaded part of an unpruned tree are more sour and imperfect than where, by good pruning, the leaves which feed them are fully exposed to the light, and receive a proper share of carbon.

The sap, thickened, reduced in bulk, and prepared in the leaves, then descends the branches and trunk, forming a layer of fresh, half-liquid substance, between bark and wood, called the *cambium*—most of which, by hardening, constitutes a new layer of wood—a small part making a new layer of bark. The annual deposits of new wood form distinct concentric rings, by which the age of the tree may be counted when the trunk is cut through. That this is the mode by which wood in exogenous trees is deposited, may be proved by an interesting experiment, performed by slitting the bark of a young tree, lifting it up carefully, and then slipping in between wood and bark a sheet of tin-foil, and binding the bark on again. The

bark will deposit layers of wood *outside* the tin-foil, and none inside; and after a lapse of years the concentric rings will be found to correspond exactly with the time since the operation was performed.



FIG. 7.—Effects of a Constriction upon the Growth of a Sapling.

The descent of the forming wood in the inner bark may be shown by tying a ligature around a growing branch, or by removing a ring of bark. The downward currents are obstructed, like that of a stream by a dam, and the new wood accumulates above the obstruction, and not below, as shown in Fig. 7.

In Grafting, it is essential that some portions of the cut surfaces uniting the stock and shoot should be placed so accurately together that the sap may flow up through the alburnum or sap-wood from the stock to the shoot, and back again through the inner bark of the shoot to that of the stock. When this union takes

place, the rest of the cut faces, even if some distance apart, are soon cemented by the newly-forming wood, which fills all the vacant space.

In Budding, the newly-set bud is cemented to the wood of the stock by the cambium, which hardens and fastens it. The next spring the bud grows, forms a shoot, and the two portions become securely united by the new wood. Unless there is enough of the cambium to cement the wood to the stock, the operation cannot succeed; and this is the reason why, with vigorously growing stocks, in which the sap is flowing freely, which are consequently rapidly forming new wood, budding succeeds better than with feeble growers, where but little of this natural cement exists.

The rapidity with which leaves exhale moisture is shown by severing them from the stem in dry weather. They soon wither and become dry. Cut a shoot from a tree, and throw it down in the sun's rays, and it will quickly shrivel, in consequence of the rapid escape of its moisture through the leaves. But first cut off all the leaves, and the shoot will remain plump a long time. This is the reason that it becomes necessary to remove the leaves at once from scions cut for budding.

Hence also the reason that plants and trees are so liable to die if transplanted with the leaves on, a disaster which may be partially prevented in trees by removing the leaves; and in plants or cuttings with leaves on, by covering them immediately with a bell-glass which, by holding the watery vapor, keeps a humid atmosphere about them. It is for this reason, also, that when young trees lose a large portion of their roots, a part of the top must be cut off, to prevent the heavy evaporation which all the leaves would occasion.

A sunflower plant, about three feet high, was found to exhale from its leaves in very dry weather between one and two pints of water in a day. A bunch of growing grass placed beneath a cool inverted glass, soon covered the sides of the glass with condensed drops from the vapor, and in a few minutes the water ran down the sides. These experiments show the great amount of water needed by growing plants; and also prove the mistake which some persons commit, by leaving weeds to grow to shade the ground and keep it moist, while



these weeds are actually pumping the water rapidly up from the soil, and dissipating it through their leaves.

The absolute necessity of leaves to the growth of a tree is shown by the fact that when they are stripped off by caterpillars, the tree ceases to grow till new ones expand; and if often repeated it perishes. When the leaves of young pear-stocks cease to act, in consequence of leaf-blight, the tree no longer grows; cambium ceases to form, and they cannot be budded. An interesting illustration of the office of leaves occurred to the writer a few years since: A yellow gage plum-tree set a heavy crop; but when the fruit was nearly grown all the leaves dropped. The fruit remained green, flavorless, and stationary, until a new crop of leaves came out. It then finished growing, acquired a golden color, and a rich, excellent flavor.

Perfect fruit requires perfect leaves; and thick, crowded, half-grown leaves give small fruit with poor flavor. The great object of pruning, and of summer pruning especially, is to give plenty of good, healthy, and not crowded foliage, and the crop will also be good.

The *green bark* of trees and plants performs an office similar to that of the leaves; and, in connection with the cells adjoining, appears to fulfil sometimes an office which the leaves fail to accomplish. This is, *preserving the identity of the species or variety*. For example, bud a *pear-tree* on a *quince*. All the wood above the place of union will be pear-wood; all below will be quince. All the supplies which come from the pear-leaves change to quince-wood the moment they pass this point; and if the budding is performed when the quince-stock is smaller than a quill, yet all the wood below, when it becomes a large tree, will still be perfect quince-wood, as is shown when any chance shoots or suckers spring up from below. Or bud, for example, the Northern Spy, which has dark bark, with the Bellflower, which has yellow; and again, bud the snow-apple, which has dark-colored bark, on the Bellflower, and the light-colored Sweet Bough on this—each being an inch above the last budding. Successive dark and light bark, the peculiarity of each variety, will remain as long as the tree grows: showing conclusively that the bark performs the finishing process in the manufacture of the new wood.

FLOWERS.

The object of the flower is the production of seeds, and through them the reproduction of new plants. The protecting organs of each are, the calyx outside, which is usually, not always, green; and the *corolla*, or flower leaves, of various colors, which are next within the calyx. The essential parts of the flowers are the *stamens* and *pistils*. Fig. 8 represents an enlarged flower of the cherry, cut through the middle, showing the small calyx, the large corolla, the many stamens, and the single pistil. Fig. 9 is a magnified flower of the purslane, showing several pistils. The head of the stamen (*b*, Fig. 10) is called



FIG. 8.—Flower of the Cherry.



FIG. 9.—Purslane Flower.



FIG. 10.—Stamen.

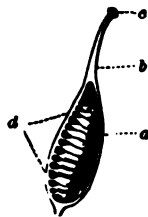


FIG. 11.—Pistil.

the anther. It contains a powder called *pollen*, which is discharged by the bursting of the anther, the pollen being the fertilizing matter essential to the production and growth of the new seed. The thread-like stalk of the stamen, *a*, is called the *filament*. The pistil (Fig. 11) consists of the *stigma*, *c*, at the top; the *style*, *b*, its support; and the *ovary*, *a*, or future seed-vessel. The *ovules*, *d*, are the rudimentary seeds. The pollen of the stamens falls on the stigma, and the ovules are fertilized or impregnated, and become seeds.

Sometimes the stamens and pistils are in different flowers, on different parts of the plant. A familiar instance occurs in Indian-corn, the "silk" being the pistils, and unless these are

impregnated by the pollen of the anthers at the top, no grains of corn will be produced.

Sometimes the staminate and pistillate flowers are not only separate, but are on distinct plants, as the Buckthorn and Hemp. The pistillate flowers are said to be *fertile*, and the staminate *sterile*, and both must be planted near each other in order to obtain fruit or seed.

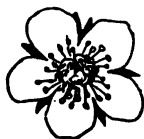


FIG. 12.
Staminate Flower.

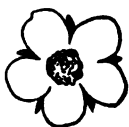


FIG. 13.
Pistillate Flower.

Sometimes the stamens, when not absent, are so defective that they cannot fertilize the pistils, or but

imperfectly. This is the case with what are termed pistillate strawberries; such, for example, as Hovey's Seedling and Burr's New Pine. In order to produce good crops, some other variety that has perfect flowers or perfectly-developed stamens, as the scarlet, or Wilson, must be planted near, from which the wind may waft or the bees carry the pollen to the imperfect flowers. Fig. 12 represents the flower of a staminate strawberry, or one in which stamens as well as pistils are perfect; Fig. 13 is a pistillate flower, the stamens being small, and con-



FIG. 14.—Stamens of Scarlet Strawberry.



FIG. 15.—Stamens of Hovey's Seedling.

taining but little pollen in the anthers. Fig. 14 is an enlarged view of the former, *a* being the stamens, and *b* the pistils. Fig. 15 is a flower of Hovey's Seedling showing at *a* the dwarfed and useless stamens. Sometimes very favorable circumstances will enable these dwarfs to afford a portion of pollen, and berries will be produced, even if they are remote from other fertilizing varieties.

SPECIES AND VARIETIES.

Plants and animals of one species are supposed never to produce a progeny of a different one, no matter how many

successive generations may intervene. Thus, for example, the seed of a pear never produces an apple, these being distinct *species*; but it gives many different sorts of pears, which are only *varieties*. So the apple produces innumerable varieties, but it can never yield a pear, a quince, or a peach.

The knowledge of the character of species, and their affinities, would frequently prevent the blunders which grafters commit, in trying to make the peach grow on the willow or butternut.

CHAPTER II.

PRODUCTION OF NEW VARIETIES.

THE tendency is more or less common with all plants, when successively produced from seed, to depart from the character first stamped upon them. These departures give rise to new varieties. This tendency to vary is increased as plants are removed from their native localities; and in an eminent degree by cultivation. Planted in gardens, and subjected to high culture, repeated and successive sowings often develop striking changes in those which for previous centuries had remained unchanged. By a constant selection of seeds from the best, a gradual improvement on the original is effected. Most of our finest fruits doubtless owe their existence to this improving process.

While a few of the seedlings from such improved varieties may become still further improved, a far greater number will probably approach toward the original or wild state. The more highly improved the fruit, the greater the difficulty to find one of its progeny which shall excel or equal the parent. In ten thousand seedlings from those high-flavored apples, the *Swaar* and *Esopus Spitzenberg*, it may be quite doubtful if any shall equal in quality those fruits themselves, while most may fall considerably below them.

The improvements effected in former ages were doubtless the result of accident, as the ancients were ignorant of the means for their systematic accomplishment. The greatest progress in the art made in modern times was effected by *Van Mons* in Belgium and *Knight* in England.

Van Mons, who directed his labors chiefly to the pear, obtained many new and excellent varieties, by a constant and successive selection of the best seedlings. He first made a large collection of natural stocks, or wild pears, choosing

those which, from the appearance of the wood and leaf, he had reason to believe would be most likely to give the best fruit. As soon as the first of these bore, he selected the best, and planted the seeds. Selections were again made from the first of these, and so on in continued succession, the best and soonest in bearing were uniformly chosen. He thus obtained fruit from the eighth generation; each successive experiment yielding an improved result on the preceding. He had, in the early part of this series of experiments, no less than eighty thousand trees; hence, in selecting from so large a number, his chance for fine sorts was far greater than from a small collection; and hence too the reason why, after seven or eight improving generations, he had obtained so many good varieties. In the early stages of his operations, he found "that twelve or fifteen years was the mean term of time from the moment of planting the first seed of an ancient variety of the domestic pear, to the first fructification of the trees which sprang from them." When his seedlings were at the age of three or four years, he was able to judge of their appearances though they had not as yet borne; such only were taken for further trial as exhibited the strongest probability of excellence. It is hardly necessary to remark that in all these trials the young trees were kept in the highest state of cultivation.

Van Mons maintained that by selecting and planting the seeds of the first crop on the young tree, the product would be less liable to turn back to the original variety than where the seeds were taken from the fruit of an old-bearing or grafted tree; and to this practice he chiefly ascribed his success. The many instances, however, of fine seedlings from old grafted sorts throw a shade of doubt over this theory. There is scarcely a question that the same extent of labor expended in crossing varieties would have given greater success.

NEW VARIETIES BY CROSSING.

New varieties are produced in crossing by fertilizing the stigma of one with the pollen from another, as described in the preceding chapter. The simplest instance which occurs is that of the strawberry, the pistillate varieties of which

must always be impregnated with pollen from staminate sorts. Thus the seed obtained from the berries of every pistillate strawberry are crosses, and if planted will produce new varieties. In fruit-trees, the stamens and pistils are in the same flower, and the chances of accidental mixture from other trees become very small, unless effected by insects, which, becoming thickly dusted with powder from one flower, plunge into the recesses of another, and effect a cross-fertilization. Where many varieties grow in one garden, in close proximity, cases of promiscuous intermixture are constantly occurring. The crosses thus produced are shown only by raising fruit from the seedlings.

In the annexed figure of the pear-blossom (Fig. 16), the five



FIG. 16.—Flower of the Pear.
a, Stigmas; b, anthers.



FIG. 17.—Flower of the Pear.
With the anthers cut out.

central organs *a* are the *pistils*; the upper extremity of each is the *stigma*. The surrounding thread-like organs, *b*, are the *stamens*, surmounted by the *anthers*. When the flowers open, the anthers burst, and discharge the pollen on the stigma, which operates on the embryo fruit at its base.

The production of new varieties is greatly facilitated by cross-impregnation, or by fertilizing the pistil of one variety with the pollen of another. This was performed with great success by Knight. Selecting two varieties, while yet early in flower, and before the anthers had burst and discharged the pollen, he cut out with a fine pair of scissors all the stamens, leaving the pistils untouched (Fig. 17). When the stigma became sufficiently mature, which was indicated by its glutinous surface, he transferred the pollen of the other sort on the point of a camel's-hair pencil. Some propagators prefer the point of the finger for applying the pollen. The fruit, thus yielded, was unchanged; but its *seeds* partook variously

of the nature of both parents, and the trees growing from them bore new and intermediate varieties.

For the success of such experiments, several precautions are requisite. The flower must be deprived of its stamens before it has fully expanded, or before the anthers have already burst and scattered their dust; the pollen must be procured from a bursting or fully matured anther, when it will be dry and powdery; the stigma must be inoculated as soon as it becomes adhesive or glutinous, otherwise it may be fertilized from another source, and then the intended pollen cannot possibly take effect. For a stigma once inoculated cannot be inoculated again. It is safest, where practicable, to force the trees by artificial heat into flowering a few days earlier than others, so as to be secure from accidental inoculations of pollen floating in the air; and to prevent its spread by bees, to apply a temporary covering of gauze, or thin oil-cloth. A want of attention to these minutiae has led some experimenters to fancy they had obtained crosses, when they had only natural seedlings.

To obtain new varieties of certain desired qualities, select two which possess those qualities separately, and seedlings from crossing will be likely to exhibit these qualities combined. Thus, a very early pear deficient in flavor, as the *Amire Joannet*, might furnish one of superior quality by a cross with a better and later sort, as *Dearborn's Seedling*. Or, a small and very rich pear, as the *Seckel*, might give us one of the larger size by fertilizing the *Bartlett*. A slow-growing and tender peach, as the *Early Anne*, might be rendered hardier and more vigorous by an intermixture with the *Early York* or *Coolidge's Favorite*. But it must be remembered, that there is a tendency in such highly improved sorts to deteriorate, and that out of thousands of seedlings, perhaps only one or two may be fully equal to the original.

The following mode of raising crosses of the grape is described by G. W. Campbell, who has experimented largely:

"To be certain of success, the grape blossom must be opened artificially, before its natural period of flowering, and all the anthers or stamens removed before the pollen or fecundating dust is formed, leaving the bare germ, with the

stigma unfertilized. To prevent the possibilities of impregnation by bees or insects, or the wind conveying pollen from other sources, the prepared blossom-bunch is inclosed in a tight, oil-silk case, and pollen supplied at the proper time from whatever variety it is proposed to cross, or hybridize with. When the berries swell, and commence growing, it is an indication that the process has been successful; and the oil-silk covering may then be removed, the bunch carefully labelled, and the seeds from these berries, when planted, are expected to produce crosses or hybrids having characteristics of both parents.

"I have also tested the accuracy of my experiments in various ways. In one instance I prepared a bunch, as if for crossing, by removing all the stamens, and inclosed it in the usual manner, but applied no pollen. Upon removing the covering some days after, every berry but one had blasted, and fell off at a touch. This one berry, being from some cause later than the rest, was just in condition to receive pollen, which I supplied from the Chasselas Musqué, and produced a grape, from which I have a seedling that may prove valuable. Other bunches, prepared at the same time, upon the same vine, and supplied with pollen at the proper time, were all fertilized, and produced full and perfect bunches. The Logan and Taylor's Bullitt both set their fruit unevenly and imperfectly, and produce usually small, straggling, and unhandsome bunches. When fertilized in the manner above stated they have produced handsome and compact bunches, the only ones of that character upon the vines.

"Seedlings almost uniformly indicate their parentage by their foliage. That of hybrids with the foreign vines is usually deeply lobed; often having much more the form of the foreign than the native leaf, although grown from the seed of the native parent. Some have foliage intermediate or resembling both in some degree. Also, in the crosses between natives, some resemble one parent and some the other. Others again seem a mixture of both."

An easier process is to plant them in close contact, so that the fruiting branches may intermingle. Out of a large number of seedlings thus obtained, there is a chance of a fair portion of them being crosses. It was in this way that Dr. Kirt-

land produced the seed of all his new and excellent varieties of the cherry.

The interesting fact that fruit trees which grow alone and distant from any other sorts are more apt to reproduce these sorts from seed with but little variation, than seeds from the same sorts in mixed orchards, shows to what extent the spontaneous crossing or mixture of varieties may be constantly going on in such orchards.

When a cross is obtained between two different *species*, instead of between mere varieties, it is termed a *hybrid*. But while varieties of the same species intermingle freely, the operation rarely succeeds between fruits of different species. The gooseberry, currant, and black currant, species of the same genus, and nearly related, have never produced a hybrid. Neither has any ever been obtained between the apple and the pear, or the pear and the quince. But different species of other plants, as the Heaths, and some of the Cacti, intermingle freely. The Rhododendron will fertilize the Azaleas, and the Red Cedar has been made to inoculate the American Arborvitæ, though both these examples are between plants of different genera. Hybrids are frequently sterile; or if they possess the power of reproduction by seed, the progeny returns to the state of one or the other of its parents.

CHAPTER III.

PROPAGATION BY BUDDING AND GRAFTING, BY LAYERS AND BY CUTTINGS.

WHEN trees are raised from seeds, as before stated, there is no certainty that the same identical variety will be reproduced. In many cases, the shade of variation will be scarcely perceptible; in others, it will be wide and distinct. It hence becomes desirable in preventing a return toward the original wild state, or, in other words, to perpetuate the identical individual thus highly improved, to adopt some other mode of propagation, for the purpose of multiplying trees of such varieties as possess a high excellence, instead of constantly creating new ones, with the hazard of most of them proving worthless.

It will be distinctly remembered, that new varieties must always spring from seeds; but the same individual variety can be multiplied only by separating the buds, or shoots bearing the buds, of such individual plant. As an example, the Fall Pippin, when first produced from seed, was a single tree of a new variety. The myriads of Fall Pippin trees now existing are only multiplications of the branches of the original. This multiplication or propagation of varieties is effected in several ways: 1, by Cuttings; 2, Layers; 3, Grafting; 4, Budding. Without these means of propagation, such delicious sorts as the Green Gage plum, the Elton cherry, and the Seckel pear, could never have been tasted except as picked from the single parent tree.

In the multitude of different modes of grafting and budding, success must depend on the observance of certain fundamental principles; a brief recapitulation, in part, of some of these laid down in the second chapter may not be out of place.

During the growing season of a fruit-tree, the sap enters at the fibrous roots, passes up through the alburnum or sap-wood, ascends to the extremities of the branches, and is distributed through the leaves. Emerging thus from the dark and minute vessels of the wood, it is spread out and exposed to the action of the light. It now becomes essentially changed in character, enters into new combinations, and is charged with the materials for the newly forming wood; it descends, not



FIG. 18.



FIG. 19.



FIG. 20.



FIG. 21.



FIG. 22.

The Downward Flow of Sap, Causing Swellings, Callus, and Roots.

through the sap-wood, but through the inner or living bark, and deposits a new layer of bark and wood in its passage. This new layer being soft and fresh, interposed between them, causes that separation known as the *peeling* of the bark.

The sap is capable of flowing sidewise, through lateral openings in the vessels or microscopic tubes. Hence some trees may be cut at one point more than half through on one side, and at another point more than half through on the other side, without intercepting the upward flow of sap, as in Fig. 18. The lateral motion explains the reason why a graft set in the longitudinal cleft of a stock receives the sap from the split surfaces of the cleft, and succeeds as well as when cross sections of both are brought into contact.

I. CUTTINGS.

When a ligature is bound closely round a branch, the obstruction which it imposes to the descending juices causes an enlargement or swollen ring above the ligature, as in Fig. 19. The same result is produced if a small ring of bark is cut out, as in Fig. 20. If a shoot is taken from the tree before the leaves expand, and plunged into moist earth till it commences growth, the descending current exuding from the lower extremity forms a *callus* or ring of the newly formed wood, as in Fig. 21; and under favorable circumstances, the granulations forming the callus emit roots into the soil (Fig. 22), and thus a new plant is formed.

Every leaf-bud on a fruit-tree may be regarded as an embryo branch, and capable of forming a tree when supplied with separate roots. But single buds do not contain within themselves sufficient nutriment to sustain vegetation till roots are formed, without a considerable portion of the sap-wood and cambium layer attached; hence the superior advantage of taking an entire shoot or cutting.

Propagation by cuttings is the simplest mode of multiplying a variety. It consists in the insertion of a shoot of one year's growth into the soil; the moisture of the soil renews the supply of sap, the buds swell, the leaves expand, and the descending juices extend themselves in the production of new roots, which shoot downward into the soil, Fig. 23.

Under ordinary circumstances, or in open ground, this mode is only applicable to such species as readily throw out roots, as the currant, gooseberry, quince, and grape. Cuttings of the apple and pear can only be made to strike root in the Northern and Middle States by confining the moisture under glass, while artificial heat is applied.

It may be stated, in general, that cuttings made of the ripened wood of such trees as have a large pith succeed best when taken off with a portion of the preceding year's wood.

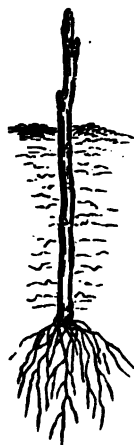


FIG. 23.—Rooted Cutting.

such as the gooseberry, currant, vine, fig, etc. With large and strong shoots, the best success will result if cuttings are separated at the point between the one and two year's growth. When small side-shoots are used, they should be cut closely to the main stem, so as to secure the *collar* or enlarged portion of the wood at the base of the shoot, Fig. 24. Roots are more readily thrown out, if the cut is made immediately below a bud.



FIG. 24.—
Cutting.

The best time to take off cuttings, in ordinary cases, is in autumn and winter. The autumn is preferable, by giving time for the wounded section to cicatrize, preparing it for the early emission of roots in spring. But where the soil is heavy or liable to heave by frost, or where the cuttings are of tender trees, they should be kept in damp mould in a cellar, to be planted as soon as the frost disappears from the ground. If not taken off till spring, the operation must be performed as early as possible. In ordinary instances, to prevent drying, about two-thirds or three-quarters of the shoot should be buried beneath the surface; and the moisture may be still further retained by a covering of manure, leaves, or moss, or by placing them under the shade of a wall or close fence. When long, like the grape, they should be placed sloping, so as not to be buried too deep or beyond the influence of the sun's warmth. Failure often results from a neglect to press the soil closely about the cutting.

To procure young plants of the gooseberry and currant with straight, clean stems at the surface, and free from suckers, it is only necessary to remove every bud except a few at the upper end, Fig. 25. The length may be from eight inches to a foot.



FIG. 25.—Cut-
ting of Cur-
rant.

There are many plants easily propagated by cuttings, if the two great requisites of vegetation, namely, moisture and warmth, are increased by artificial means, as in a hotbed under glass; or in a propagating-house, under sash, or bell-glasses, with fire heat gently applied beneath.

II. LAYERS.

A layer is a low side-shoot bent down and buried at the middle in the soil, Fig. 26. The buried portion strikes root, when it is taken off and planted separately. Its advantages over a cutting is, that it is nourished by the parent plant while the roots are forming. Hence many plants which cannot be increased by cuttings, and indeed with great difficulty by budding and grafting, may be propagated readily by layers.

When roots are freely emitted, as from the grape, simply bending the middle of the branch into the soil is enough to



FIG. 26.—Layering.

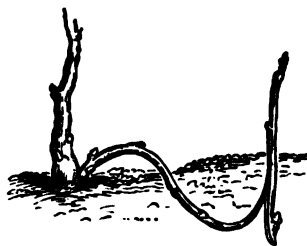


FIG. 27.—Slitting layers.

insure success. But in cases of difficulty, other expedients are resorted to; one of the most common is to split a portion upward, immediately under a bud (Fig. 27), which enables the newly forming roots to pass freely and at once into the soil without the resistance of the thick bark which they otherwise must pierce. Sometimes the branch is cut partly off to intercept the downward passage of the fluids, and induce them to form into roots. At other times a wire ligature, or the removal of a narrow ring of bark, effects the same purpose. Burying the layer several inches under the surface is necessary, to keep it in moist earth; and in drouth, mulching would be beneficial. A small excavation of the soil at the spot is convenient; and when the branch is stiff, it must be fastened down with a forked stick.

The excavation should be made with a spade. Use both hands in bending the shoot, so that it may not be bent too short and break. If properly done, it will press against the

nearest side of the hole, rest on the bottom, and rise up, pressing against the opposite side, when it should be fastened *up-right*, and, if necessary, to a small stake. At the time of bending, a sod or other weight may be laid on to keep it down till the hole is filled; and if the mellow earth be pressed firmly down with the foot, no forked stick will be usually necessary.

The most favorable state of a plant for layering is when the bark is somewhat soft and not too ripe, and the worst shoots are those which are stunted, and with a hard bark. There are, however, no shoots whatever, not actually diseased, that will not root by layers, if sufficient time be given. Layers, like cuttings, may be made of the ripened wood in autumn or spring; or of the growing wood at or a little before midsummer, when the part intended to root is somewhat mature and firm in texture. The pear, the apple, and the quince, if layered early in the spring, or the grape in summer, will usually be well rooted in autumn.

A moist season is the most favorable to the rooting of layers, by preserving a softer bark. For this reason, many plants may be more easily propagated in England than in the United States; and more readily in Ireland than in England.

Layering is largely made use of for propagating the grape, occasionally for the quince, and sometimes for the apple. It is also of very extensive application in propagating many ornamental trees and shrubs.

Suckers may be regarded as spontaneous layers, the new shoots being sent up from buds on the roots or portions of the stem beneath the surface of the ground. They are much employed in multiplying most species of the raspberry. The runners of strawberries may be regarded as layers or suckers above ground.

III. GRAFTING.

Upwards of twenty different modifications of grafting were mentioned by the ancient Roman writer, Varro; and Thouin, of Paris, has described and figured more than a hundred kinds. The great number of modes given in books has tended rather to bewilder than to enlighten beginners; the following remarks, therefore, are more for the purpose of laying down

reasons on which success depends, than for pointing out the peculiar modes of operation, which may be varied according to convenience, provided attention is given to the essential particulars.

Propagation by grafting differs mainly and essentially from increasing by cuttings, by inserting the cutting into the growing stock of another tree instead of directly into the soil. The stock thus supplies the sap, as the soil does in the case of a cutting; and the graft, instead of making roots of its own, extends its forming wood downward, at the inner surface of the bark, into the stock itself. Hence there are two chief requisites for success: the first, that the graft be so set in the stock, that the sap may flow upward without interruption; and the second, that the forming-wood may extend downward uninterruptedly through the inner bark. To effect these two requisites, it is needful, *first*, that the operation be performed with a sharp knife or grafting



FIG. 28.—Grafting Chisel.

chisel, Fig. 28, that the vessels and pores may be cut smoothly and evenly, and the two parts brought into immediate and even contact. *Secondly*, that the operation be so contrived that a permanent and considerable pressure be applied to keep all parts of these cut faces closely together. *Thirdly*, that the line of division between the inner bark and the wood coincide or exactly correspond in each; for if the inner bark of the one sets wholly on the wood of the other, the upward current through the wood and back through the bark is broken, and the graft cannot flourish or grow. And, *fourthly*, that the wounded parts made by the operation be effectually excluded from the external air, chiefly to retain a due quantity of moisture in the graft, but also to exclude the wet, until, by the growth of the graft, the union is effected.

1. The first requisite is best attained by keeping a keen,

flat-bladed knife to cut the faces, and another knife for other purposes. Fig. 29.

2. The second requires that the jaws of the stock, in cleft-grafting, press with some force, but not too much, against the

wedge-shaped sides of the graft. A stock one-third of an inch in diameter will sometimes do this sufficiently; but three quarters of an inch is a more convenient size. In whip-grafting, the tongue and slit should be firmly crowded or bound together.

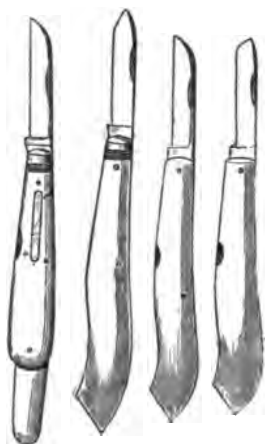
3. The third requisite is attained by close examination with the eye.

4. The fourth is accomplished by plasters of grafting-wax, or by the application of grafting-clay. Grafting-wax may be purchased of any seedsman, or if preferred for any reason it may be made by melting together rosin, tallow, and beeswax.

An excellent grafting-wax is made of three parts of rosin, three of beeswax, and two of tallow. A cheaper com-

FIG. 29. — Grafting, Budding and Pruning Knives.

position, but more liable to adhere to the hands, is made of four parts of rosin, two of tallow, and one of beeswax. These ingredients, after being melted and mixed together, may be applied in different ways. The wax may be directly applied when just warm enough to run, by means of a brush; or it may be spread thickly with a brush over sheets of muslin, which are afterward, during a cold day, cut up into plasters of convenient size for applying; or, the wax, after becoming cold, may be worked up with wet or oiled hands, drawn into thin strips or ribbons, and wrapped closely around the inserted graft. In all cases success is more certain, when the wax is pressed so as to fit to every part, and leave no interstices; and it is indispensable that every portion of the wound on the stock and graft be totally excluded from the external air. In cool weather, a lantern, or hot brick, or some other method of obtaining heat will be found necessary to soften the plasters before applying them.



CUTTING GRAFTS.—Cut these in autumn if you have a good place to pack them, but if well kept they may be taken at any time between the cessation of growth in late summer or au-



FIG. 35.—Cleft-grafting.



FIG. 34.—Opening the Cleft.



FIG. 31.



FIG. 33.

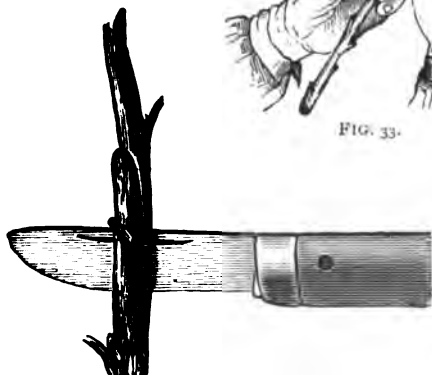


FIG. 32.



FIG. 30.

turn, and the commencement of vegetation in spring. Those cut in autumn, however, will have more vigor in spring than if exposed to the cold of any severe winter—this is especially the case with plums, pears, and cherries. Pack them in boxes

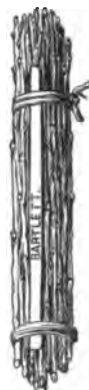
of damp (not wet) moss, or in small boxes of damp (not wet) sawdust—large boxes of sawdust will heat. Mark every sort carefully and plainly. Another good way to keep scions through winter is to place them snugly in a box till it is more than half full; next nail in two or three cross-pieces to hold them, and then bury the box inverted with several inches of earth over it, on a dry spot or knoll. They will thus be kept from contact with the wet earth, and will receive enough moisture from below to keep them fresh and plump. Cuttings of currants, grapes, quinces, gooseberries, etc., are to be taken off in autumn, and they may be kept till early spring in the same way as grafts, or they may be set out at once, pressing the earth compactly against them and covering well till spring with manure, litter, leaves, or evergreen boughs.



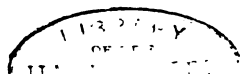
FIG. 36.

The accompanying engravings (Figs. 30 to 36), serve to show more distinctly than the directions given in the preceding part of this chapter, the details of the operations of budding and grafting. Fig. 30 represents the appearance of a shoot of the pear, of one summer's growth, at the time it is cut

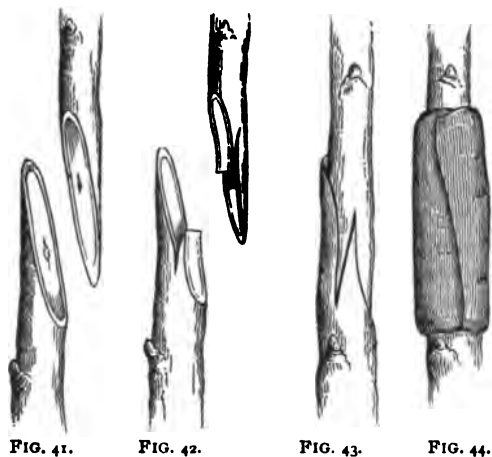
from the parent tree to furnish the buds, and will answer as an illustration for the apple, cherry, or other fruit. The portion between the cross-lines furnishes the best developed and

FIG. 37. FIG. 38. FIG. 39.
Making and Packing Grafts.FIG. 40.—Grafts Packed for Sending
by Mail.

ripened buds. Fig. 31 is the appearance of the shoot after the leaves are cut off. Fig. 36 shows how the buds may be taken off. Fig. 32 shows the manner in which the budding-knife is inserted under the bud for its removal; and Fig. 33 the position in which the shoot is held during the operation.



CARE OF GRAFTS.—In cutting, the name may be kept temporarily by writing with a common lead-pencil on a shaved portion of the shoot (Fig. 37); but for packing away permanently, write the name on both sides of a strip of shingle, say a foot long and half an inch wide (Fig. 38), and tie this up with the scions, the outside writing readily showing the name, the inner to refer to in case the outside is erased (Fig. 39). Scions not fully hardy, as of most sorts of plums, should be



cut early in winter, or before they have been exposed and injured by severe cold.

In order to send scions by mail, they are best put up by enclosing them in cases of oil-silk (such as is used for hat-lining), by wrapping the oil-silk about the scions and over the ends, and then passing a fine thread repeatedly round from end to end, making the whole air-tight (Fig. 40). The natural moisture is thus preserved, and they cannot shrivel. The names should be written with pencil on the ends, and no paper for this purpose wrapped around them, as it absorbs the moisture. Grafts have been shrivelled and spoiled by mistakenly placing dry cotton batting among them before thus encased. To send grafts in larger quantities, or by "express," pack them in alternating layers of fine, slightly damp moss. It is always

important, whether packing grafts for keeping or for distant conveyance, to preserve the natural moisture precisely, and no more. If the packing is too wet, they will become water-soaked and rot.

Grafts which have become dry may be restored if the moisture is applied so gradually that its absorption may require several weeks, by burying them as above stated.

The following figures represent the two most common modes of grafting fruit-trees: Figs. 41 to 44 representing successive stages of *whip or tongue grafting*, from the sloping cut of the scion and stock, to the completion of the operation by the covering with the wax plaster.

Whip-grafting may be employed for large as well as small stocks. In order that the line of separation between the bark and wood may coincide in both, unless the graft be as large as the stock it must be placed at one side (Fig. 45), *a*, sloped and tongued for the reception of the graft, *b*, their union being represented by Fig. 46. To facilitate the wrapping of the wax plasters, one side and the

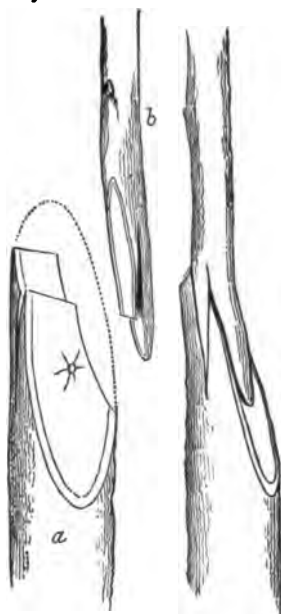


FIG. 45. FIG. 46.
Whip-grafting Large Stocks.

upper point of the stock are pared off with a knife, before the two are joined, as shown by the dotted line. This is a good mode of grafting any stocks not over three-fourths of an inch in diameter, in the nursery row.

Fig. 47 shows a stock cut off for cleft-grafting, with the upright cleft separated by the grafting-chisel ready for the graft; Fig. 48, the graft cut wedge-form to fit it; Fig. 49, the graft in its place, and Fig. 50 after the wedge has been withdrawn, the projecting angle of the stock sloped off with a knife, and the whole ready for the application of the wax.

Whip-grafting is particularly applicable to small stocks, or

where the graft and stock are nearly of equal size; and cleft-grafting to stocks considerably larger than the graft. In all cases, where the stock is any degree larger, the graft must be placed toward one side, so that the line between the bark



FIG. 47.

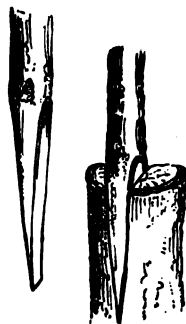
FIG. 50.
Cleft-grafting.

FIG. 48.

FIG. 49.

and wood may exactly coincide at one point at least in both, as in the cross-section of cleft-grafting, Fig. 50. A useful implement for the rapid and perfect performance of cleft-grafting is the grafting chisel, here shown.

In **SADDLE-GRAFTING**, the stock is sloped off on each side, giving it the form of a wedge,

Fig. 51, *a*; the graft is split in the middle, and each side thinned away with the knife, as in Fig. 51, *b*, until it will closely fit when placed like a saddle upon it. The most perfect way to fit the graft is to make a long sloping cut from the outer edge or bark, by drawing the blade from heel to point, till it reaches the centre of the graft; and then another similar cut completes the acute

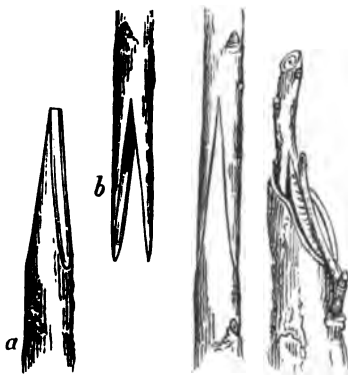


FIG. 51.

FIG. 52.

FIG. 53.

Saddle-grafting.

cavity for fitting the wedge of the stock. A sharp, broad, and thin blade is needed for this operation. A wax plaster, drawn closely round the place of union, completes the work. When

the stock and graft are very nearly of equal size, this is a very perfect mode of grafting, as large corresponding surfaces are made to fit, and the graft receives freely the ascending sap.

In all these modes of grafting, whenever a wedge is made to enter a cleft, it should be thickest on the side where the fit is made between the two parts, so as to receive the full pressure of the cut faces at that side, as shown in Fig. 50.

A modification of saddle-grafting, very successful in its results, is thus performed: Late in spring, after growth has commenced, the scion, which is much smaller than the stock, is split up, nearer to one side, more than half its length (Fig. 53). The stronger side is then sharpened into a wedge at its point, and introduced between the bark and the wood, a slight longitudinal slit being made through the bark of the stock, that it may open slightly and admit the graft. The thinner division of the graft is fitted to the opposite sloping side of the stock. The whole is then covered with wax. The great length of that portion of the graft in contact with the bark and fresh wood greatly facilitates their union; while the cut face of the stock is speedily covered with a new growth by that part of the graft which rests upon it.

Veneer-grafting is still another method, strongly advocated by some. Mr. E. S. Crandall of Michigan thus describes the process. Fig. 54 will explain the veneer-graft: A shows the cuts upon stock and scion; these cuts are not to extend into the wood, but simply through the bark, so that when placed in position the exposed



FIG. 54.—Veneer-grafting.

broad surfaces of cambium come together; B shows stock and scion in contact, and bound with raffia or other material; C shows a veneer-grafted apple-tree after one season's growth. While the cuts are easier to make than those of the whip-graft

there is this disadvantage, which to men who graft in quantity is an important consideration—that it requires more care in the tying. The band must be strong and should be firmly adjusted, to insure keeping the scion in place until union is effected.

It seems almost unnecessary to remark that in grafting, when cut surfaces of hard wood are placed together, no union takes place between them, and yet I have not unfrequently met practical men, who could graft well, who were not clear on this point, but supposed that union took place over the whole cut surface. It is in the cambium and young sap-wood, and there only, that the power of union and growth lies.

Now, in the veneer-graft, the only cut surfaces of wood are the oblique end-cuts, and as stock and scion are placed together, the oblique cut on the scion is covered by the tongue of bark on the stock, so that if the work is well done union takes place all around the cut wood, and it is securely protected from outside influence. The oblique end-cut on the stock being surrounded by growing tissue is usually imbedded in new growth the first season. The union between the side-cuts, which should be of the same width, and from an inch to an inch and a half in length, is complete throughout. This I have proved by making transverse and longitudinal sections of a large number of grafts.

In grafting the peach, which, from its large pith and spongy wood, scarcely ever succeeds as commonly performed, it is found advantageous, in selecting the grafts, to leave a quarter of an inch of the more compact two-years' wood at the lower extremity.

In grafting the plum and cherry, success is found to be much more certain when the work is performed very early in spring, before the buds commence swelling, or even before the snow has disappeared from the ground. Apples and pears may be grafted later, and if the scions have been kept in good condition in a dormant state, they will mostly grow if inserted even after the trees are in leaf.

After a graft is inserted, and as soon as the tree commences growth, the buds on the stock must be rubbed off, in order to throw the rising sap into the scion. If large trees are grafted, the buds need only rubbing off the branch which holds it.

Where it becomes desirable to preserve rare sorts, which

have been grafted late in spring, a loose wrapper of white paper round the graft will protect it from the drying and scorching rays of the sun; or shrivelling and failure will often be prevented by covering the whole graft with a wax plaster; or by encasing it in moss kept damp by occasional applications of water.

ROOT-GRAFTING. This is done by whip or tongue grafting, already described on a previous page. It is wholly performed



FIG. 55.

within doors, and consequently the seedlings must be taken up the preceding autumn.

Root-grafting is well understood by nurserymen; but there are many who desire information on the subject, and especially on the expeditious performance of this operation. A grafter may work hard a whole day, and by an inconvenient



FIG. 56.—Showing a Cut from Shoot, Natural Size.

arrangement of tools and materials, insert not a third as many as another, who gives careful attention to all these particulars. The following method is the result of long practice, and by it we have known a skilful workman to insert three thousand grafts, with an assistant to apply the wax plasters, during ten hours in a single day, in the best manner, and three thousand five hundred on another occasion, in eleven hours.

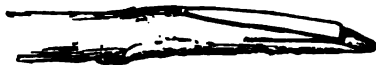


FIG. 57.

The tools consist, first, of a sharp, thin-bladed knife, of which the best is made from the blade of an old scythe, ground to its proper form on a grindstone; second, a bench or table placed in front of a light window, and on which the work is done; third, an apron, worn by the grafter, the two

lower corners being hooked fast to two sharp nails on the near edge of the table, for holding the scions while cutting them; fourth, strips of waxed paper, about an inch wide, made by brushing over sheets of thin, tough paper a melted



FIG. 58.

well-stirred mixture of four parts of rosin, two of tallow, and one of beeswax, and then cut into strips when precisely at a proper degree of coldness to separate well by means of a knife cutting upon a smooth board. A sufficient number of



FIG. 59.

these for immediate use should be hung near enough to the stove which heats the room, to keep the wax upon them about the consistence of butter on a summer day, so as to fit and adhere to the grafted root, without melting and running.



FIG. 60.

The first operation is to cut up the grafts from the shoots or scions. It is performed by holding the scion in the left hand, the thicker end pointing toward the right hand, which holds the knife. Such a shoot is represented of diminished size by

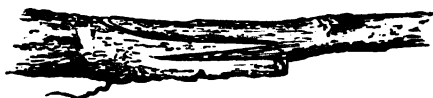


FIG. 61.

Fig. 55, the points, *a, a, a*, the places where it is cut into grafts, and the dotted lines show how the cuts are made. Fig. 56 shows a portion of the shoot the natural size; 1, the first cut nearly directly across; 2, the second or sloping

cut, and 3, the slit for the tongue; and the whole finished and separate in Fig. 57. Three strokes of the knife are thus required to cut and prepare each graft, and a rapid and skilful operator has done one hundred and twelve in the manner described, in five minutes. Each shoot is thus cut up while yet held in the left hand, and the grafts, as fast as they are severed, drop into the cavity of the apron already described. The counting is done during the process of cutting, and at no other time.

The second operation is setting these grafts into the roots. Each root is held in the left hand precisely as the scion has been (Fig. 58); the three cuts are given it (shown by the

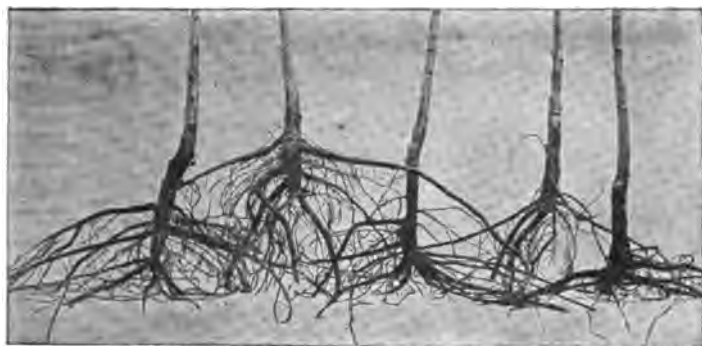


FIG. 62.—Piece Roots.

dotted lines in Fig. 59), to prepare it for the graft (as represented in Fig. 60). The grafts having been placed directly under the operator's fingers, and in the right position, each one is successively taken and firmly fitted to the prepared root, as shown in Fig. 61, and as soon as this is done, another cut of the knife, three inches lower down the root, severs it, and the root-graft is finished, and drops off obliquely on the table. Another sloping cut on the same root, and a slit for the tongue, are quickly made, and another graft picked up and inserted, the root being held all the while in the left hand, until worked up. The great point is to perform much with little handling. A single root will sometimes make but one graft, which is then called whole-root graft, but more

commonly two or three, and sometimes more, piece-root graft. Each portion of root should be about three inches long, and the graft about five inches.

The comparative advantages and disadvantages of whole-root and piece-root grafting have been subject for controversy ever since Thomas A. Knight introduced the latter in 1811. It is apparent that the economy of piece root-grafting, in that one root is made to serve as the foundation for several trees, must commend it upon commercial grounds—but it has advocates who also strictly maintain that it produces as many and as good roots as the whole-root process. The weight of evidence, however, appears against it—and there are few, prob-



FIG. 63.—Whole Roots (Budded).

ably, who at the same price would not prefer to try stock which had been grafted or budded upon whole roots.

Figs. 62 and 63 by Mr. L. H. Bailey show the characteristic appearance of both processes.

Root-grafting may be performed at any time during winter, and those who have much of it to do often continue the process the winter through. The roots when taken up in autumn should be well washed, the tops cut off, and the roots packed in boxes with alternate layers of damp moss. Thrifty one-year roots are better and more easily worked than two-year roots. Side roots, or branches, should never be used. The scions may be kept in the same way. This is better than packing them in sand, which imparts a grit to them and dulls

the knife. Different modes are adopted for packing away the grafts. The best is to place them flat in boxes, in alternate layers with sand, like miniature cord-wood, keeping the outer or graft-ends very even, and carrying up each layer separately and one at a time, so that one may be taken up for setting out, without interfering with the next succeeding pile. The sand should be slightly moist and not wet. The varieties should be distinctly marked on strips of board separating each kind, where there is more than one in a box; and in addition to this, a card should be nailed on the outside, naming the kinds, at the point of separation between them. A record should also be made as they are deposited, of the sorts, their order, and the number of each. Boxes two feet long, a foot wide, and six inches deep, are a convenient size, and will hold from one to two thousand each. If furnished with bow handles, they are easily carried at once to the field for setting out. Boxes holding twenty thousand or more keep the grafts equally well, but require additional labor in unpacking when set.

They should be set out in spring as soon as the soil is sufficiently dry, and there is no further danger of its freezing severely. Special pains should be taken to pack the earth well about them, as they are dibbled in. The tips of the grafts should project about half an inch above the surface. The proper depth of setting is controlled somewhat by circumstances; if deep, the soil may be too cold to start them well; if not deep enough, the drought of summer may destroy them. An active hand will set two or three thousand in a day, and in rare instances five thousand.

IV. BUDDING.

Budding consists in introducing the bud of one tree, with a portion of bark and a little adhering wood, beneath the bark of another, and upon the face of the newly forming wood. It must be performed while the stock is in a state of vigorous growth. An incision is made lengthwise through the bark of the stock, and a small cut at right angles at the top, the whole somewhat resembling the letter T, Fig. 64. A bud is then taken from a shoot of the present year's growth, by shaving off the bark an inch or an inch and a half in length, with a

small part of the wood directly beneath the bud, Fig. 65. It is not a common practice in this country to take the thin shield of wood out of the butt, but it is sometimes done ad-

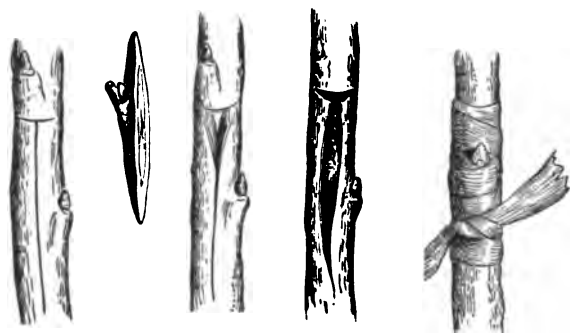


FIG. 64. FIG. 65. FIG. 66. FIG. 67. FIG. 68.

Successive Stages of Budding.

vantageously when this portion of wood is too old or hard to fix the stock readily. The edges of the bark, at the incision in the stock, are then raised a little, Fig. 66, and the bud held as shown in Fig. 67, pushed downward under the bark, Fig. 68 and Fig. 70. A bandage of bass, corn-husk, or other substance, is wrapped round, covering all parts but the bud. The pressure should be just sufficient to keep the inserted portion closely to the stock, but not such as to bruise or crush the bark, Fig. 69 and Fig. 71.

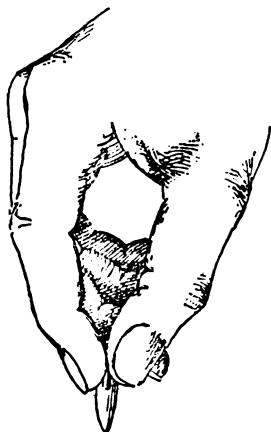


FIG. 67.—Manner of Holding Bud.

The shoots containing the buds should be cut when so mature as to be rather firm and hard in texture; they are usually in the best condition after the terminal bud has formed. To prevent withering, the leaves must be immediately cut off, as they withdraw and exhale rapidly

the moisture from the shoot; about one-quarter of an inch of the footstalks of the leaves should remain, to serve as handles

to the buds while inserting them, Fig. 72. After being thus divested of leaves, they may be safely kept a week in a cool, damp place, or sent hundreds of miles in damp moss, or en-



FIG. 70.

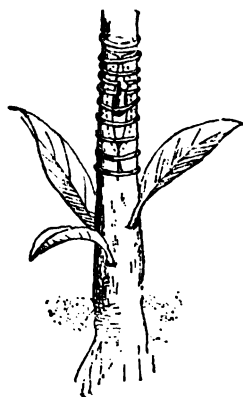


FIG. 71.

cased separately in thin oil-cloth.

When, by growth of the stock, the bandage cuts into it, usually in ten days or more, it must be removed. The bud remains dormant till the following spring, when the stock is cut off two inches or more above it, before the swelling of the bud. If cut closer, the end of the stock becomes too dry, and the bud often perishes. All other buds must be then removed, and all the vigor of the stock or branch thrown into the remaining bud, which immediately commences a rapid growth.

To secure a straight and erect



FIG. 72.—Stick with Buds.



FIG. 73.—Tying the Young Shoot.

tree, the new shoot, when a few inches long, is tied to the remaining stump of the stock, Fig. 73. By another month, no further support will be needed, and the stump may be wholly cut away, and the wound allowed to heal by the rapid formation of new wood.

Buds inserted by midsummer may be made to grow the same season by heading down the stock when adhesion has taken place; but although often attempted, no advantage has resulted from this practice, as the growth is comparatively feeble, and in consequence of its badly matured wood often perishes the following winter. Even where it escapes it does not exceed in size at the close of the second season the straight and vigorous shoots of the spring.

TERMINAL BUDDING.—It sometimes happens, where buds are scarce, that the terminal bud on the shoot may be used to ad-

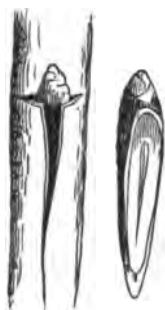


FIG. 74—Terminal Budding.

vantage. In this case, the wood is cut sloping downward, and the insertion is made as usual, Fig. 74, except that it becomes necessary to apply the whole of the ligature below the bud. The buds on small side-shoots which are not more than an inch or two long, may be successfully used in this way, as the terminal eyes are stronger than any of the others. This practice may sometimes be adopted with advantage with the peach, where scions of feeble growth only can be obtained, as terminal buds usually escape the severity of winter when most of the others are destroyed.

SPRING BUDDING is successfully practised as soon as trees are in leaf, the buds having been kept dormant in an ice-house or cool cellar. As soon as they have adhered, the stock is headed down, and a good growth is made the same season. The peach, the nectarine, the apricot, and the mulberry, all difficult to propagate by grafting, may in this way be easily increased by budding. For a description what is called "*June budding*" see chapter xxviii. on the peach. If the buds are kept in a cellar, it will be found important to preserve with them as uniform a degree of moisture as possible, and in as small a degree as will keep them from wilting.

ANNULAR BUDDING is applicable to trees of hard wood, or thick or rigid bark, as the walnut and magnolia. A ring of bark is removed from the stock; and another corresponding ring, containing the bud, slit open on one side, is made to fit the denuded space (Fig. 75).

The essential requisites for success in budding are, *first*, a thrifty, rapidly growing stock, so that the bark will peel very freely. *Secondly*, a proper time; not so early that there will be too little cambium or mucilaginous cement between the bark and the wood, for the adhesion of the bud; nor so late that the bark will

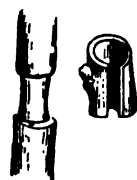


FIG. 75.—Annular Budding.

not peel, nor the subsequent growth sufficiently cement the bud to the stock. *Thirdly*, buds sufficiently mature. *Fourthly*, a keen, flat knife, for shaving off the bud, that it may lie close in contact upon the wood of the stock. *Fifthly*, the application of a ligature with moderate pressure, causing the bud to fit the stock closely.

When stocks are in the best condition, it is unnecessary to raise the bark any further than to admit the lower point of the bud, which as it is pushed downward, performs this operation in the most perfect manner. When the bark does not peel freely enough for this purpose, success becomes uncertain.

Budding is performed in summer, grafting in spring, and both have their advantages. Budding is a simpler operation, and more successfully performed by a novice. It is the best means to multiply the peach and nectarine, grafting rarely proving successful at the North. It is more rapidly performed, and at a season not crowded with the labors of transplanting. It admits a repetition the same summer, in cases of failure, the stocks remaining uninjured. But in all cases thrifty stocks are needed, while grafting will succeed on those older and less vigorous. Grafting requires less care subsequently, as no ligatures need removing, nor stocks heading down, and may be conveniently employed as a remedy for failures in the previous summer's budding.

LIMITS OF BUDDING AND GRAFTING.

In former ages of the world, it was erroneously supposed that grafting could be performed between every species of

tree and shrub. "Some apples," says Pliny, "are so red that they resemble blood, which is caused by their being at first grafted upon a mulberry stock." Roses, it was said, became black when grafted on black currants, and oranges crimson if worked on the pomegranate. But the operation is never successful unless the graft and stock are nearly allied, and the greater the affinity the more certain the success. "Varieties of the same species unite most freely, then species of the same genus, then genera of the same natural order; beyond which the power does not extend. For instance, pears work freely upon pears, very well on quinces, less successfully on apples or thorns, and not at all upon plums or cherries; while the lilac will take on the ash, and the olive on the Phillyrea, because they are plants of the same natural order."

There are, however, some exceptions to this rule. Thus, the cultivated cherry, and most species of wild cherry, though of the same genus, will not agree. The pear succeeds better on the quince than on the apple, although the apple and pear are within the same genus, and the pear and quince are by most regarded as of distinct genera; the superior firmness of the wood of the quince, a quality so important to successful grafting, more than compensates the difference in affinity.

Lindley mentions also some exceptions which are apparent only. In one case, the fig was supposed to grow on the olive. But the graft, being below the surface of the soil, rooted independently of the fig-stock. "I have seen," says Pliny, "near Thulia, in the country of the Tiburtines, a tree grafted and laden with all manner of fruits, one bough bearing nuts, another berries; here hung grapes, there figs; in one part you might see pears, in another pomegranates; and to conclude, there is no kind of apple or other fruit but there was to be found; but this tree did not live long." This is explained by the process now sometimes performed in Italy, for growing jasmines and other flexible plants on an orange-stock, by the ingenious trick of boring out the orange stem, through which the stems of the other plants are made to pass, and which soon grows so as to fill it closely, and to appear as if growing together. Such a crowded mass of stems must, of course, soon perish.

SAVING MICE-GNAWED TREES.—A MODIFICATION OF GRAFTING.

Young orchards which are kept perfectly clean by cultivation, are seldom injured by mice under snow. There are some instances, however, where mice will attack those which stand near the boundary fences or in proximity to grass; and sometimes a hard crust of ice or snow may be formed on the surface, over which mice will travel beneath a second fall of snow, in committing their depredations. Many young orchards are more or less encumbered with grass and weeds, and the trees are often found girdled in spring. A preventive that rarely fails, that of embanking small mounds of smooth earth



FIG. 76.



FIG. 77.

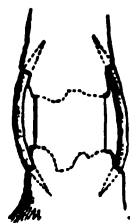


FIG. 78.

round the trees in autumn, is not often adopted, and hence we have frequent inquiries, "What shall we do to save our mice-gnawed trees?"

Fig. 76 represents the stem of a young tree entirely girdled near the surface of the ground. The tree will, of course, perish unless a connection is made between the two portions of bark.

An easy way to repair this damage is represented in Fig. 77. It consists merely in fitting into openings, made with a half-inch chisel, short pieces of round wood sharpened at both ends to fit the chisel-cuts. These cuts are made by placing the chisel, when making the lower cuts, nearly upright or slightly inclining outward from the tree, and then placing the point upward in a corresponding direction when making the upper cuts. The sharpened pieces or shoots are then bent

outward in the middle until the points will enter the openings, when they are firmly crowded in with the hand until brought nearly straight, as shown in the figure. Fig. 78 exhibits a section of the tree and the exact position of these pieces when inserted. Where a large number of trees are injured, four or five pieces to each tree are enough. They will rapidly enlarge as the tree grows, and in a few years become confluent. If a few choice trees have been girdled, a larger number may be inserted, so that they may be nearly in contact—thus securing a complete cure in a year or two. The work may be covered with grafting wax or with a small mound of earth—perhaps the operation would be successful without any covering. It is not necessary that it be performed very early in spring—it will even answer after the buds have begun to swell.

CHAPTER IV.

SOIL, MANURES, SITUATION, AND ENCLOSURES.

THE soil for fruit-trees, as well as for farm crops, should be of good quality. Whatever will produce a vigorous growth of corn and potatoes will in general be the best for fruit-trees. Sterile soil is unfavorable for both; but doubly so for the latter; for while it only lessens in *quantity* the growth of farm crops, it lessens the quantity and greatly injures the *quality* of fruit.

Good soils vary in many particulars; but as a general rule, one which is dry, firm, mellow, and fertile, is well suited to this purpose. It should be deep, to allow the extension of the roots; dry, or else well drained, to prevent injury from stagnant water below the surface; firm, and not peaty or spongy, to preclude injury or destruction from frost.

Few soils exist in this country which would not be much benefited, for all decidedly hardy fruits, as the apple and pear, by enriching. Shallow soils should be loosened deeply by heavy furrows; or if the whole surface cannot be thus treated, a strip of ground eight feet wide, where the row of trees is to stand, should be rendered in this way deep and fertile for their growth. Manure, if applied, should be thoroughly intermixed with the soil by repeated harrowings. An admirable method of deepening soils for the free admission of the fine fibrous roots is, first, to loosen it as deeply as practicable with the subsoil-plough; and then to trench-plough this deeply loosened bed for the intermixture of manure. The previous subsoiling admits the trench-plough to a greater depth than could be attained without its aid. The only trees which will not bear high fertility are those brought originally from warmer countries, and liable to suffer from the frost of winter, as the peach, nectarine, and apricot; for they are

stimulated to grow too late in the season, and frost strikes them when the wood is immature. It however happens, in the ordinary practice of the country, that where one peach or apricot tree is injured by too rich a cultivation, more than a hundred suffer by diminished growth from neglect.

Clayey and light soils in some cases require opposite management. The former, for instance, is much benefited by the admixture of chip-dirt, which renders it looser, lighter, and more retentive of moisture. But on light soils the effect is not so beneficial, and is sometimes positively injurious.

Peaty and spongy soils are particularly unfitted for tender fruits. They become very warm by day, and radiate the heat rapidly in clear frosty nights; hence, peaches and apricots generally perish when growing on them, the heat of the sun promoting a rapid succulent growth, which is the more easily destroyed by the succeeding intensity of cold.

MANURES.

Nothing for general use is equal to stable manure, and in ordinary cases it will be found to give the most uniform and satisfactory results—more especially if it is made the basis of



FIG. 79.—Draining Orchards.

a compost with peat, muck, or turf from old pastures, with a tenth or a fifteenth of bleached ashes, and half that of bone-dust. If these are thoroughly mixed with the soil down to a depth of a foot or more, by subsoiling, trench-ploughing, and cross-ploughing, in connection with repeated harrowings, fine trees and excellent fruit may be confidently expected even on

soils of naturally moderate fertility. Many parts of the Western States possess a soil quite rich enough, provided good cultivation is given. A *well-drained* subsoil is of course all-important, for all manure is nearly lost on land kept soaked with water. Even old bearing trees have been much improved by laying tile two and a half or three feet below the surface, midway between the rows (Fig. 79). The young forming-roots, being the most remote from the tree, receive the greatest benefit from drains thus placed, and the tile is less liable to be thrown out of position by large roots or filled by smaller ones.

SITUATION.

After a suitable soil is obtained, hardy trees, such as the apple, will usually succeed in almost any situation. But with tender fruits, as the peach and apricot, the case is very different. In many localities in the Northern States, they are soon destroyed by the severity of winters, and their cultivation is accordingly not attempted. In others, crops are not yielded oftener than once in two years. But some situations are so favorable, that a failure scarcely ever occurs. In planting out tender fruits, it is consequently desirable to know what places will prove the best. Even the apple, in regions where the winters are rigorous, is sometimes destroyed by frost, and in very unfavorable places rarely escapes.

It is familiar to many cultivators, that warm, low valleys are more subject to night-frosts than more elevated localities. Objects at the surface of the earth are chilled by the radiation of heat to the cold and clear sky above, and they cool by contact the surrounding air, which thus, becoming heavier, rolls down the sides of declivities and settles like the waters of a lake, in the lowest troughs. This coldness is further increased by the stillness of those sheltered places favoring the more rapid cooling, by radiation of the exposed surfaces; while on hills the equilibrium is partially restored by currents of wind. Superadded to these causes, vegetation in low, rich, and sheltered places is more luxuriant, and wood less ripened, and hence particularly liable to injury from frost. The mucky soil of valleys radiates heat rapidly from its surface. The

warmth of low places, during the mild weather, occurring in winter, often swells fruit-buds, and succeeding cold destroys them. On more elevated lands, vegetation escapes all these disastrous influences.

The existence of colder air in valleys, on still, clear nights, is often plainly observed in riding over a rolling or broken face of country. The thermometer has shown a difference of several degrees between a creek bottom and a neighboring hill not fifty feet high. A striking proof was exhibited a few years since after a severe night-frost early in summer. The young and succulent leaves of the hickory were but partially expanded; and where the trees stood in a valley, twenty feet deep, all the leaves had been frosted, and were black and dead, up to the level of the banks on each side, while all above the surface of this lake of cold air were fresh and green.

During the cold of a clear winter night some years ago, which sank the thermometer several degrees below zero, after the peach buds had been swelled by a few warm days, trees which stood on a hill thirty feet higher than the neighboring creek valley lost nine-tenths of their blossoms; while on another hill sixty feet high, nine-tenths escaped. The lake of cold air which covered the top of the smaller hill did not reach the summit of the larger.

The cultivation of the peach is rarely attempted in the southern tier of counties in the State of New York. Proofs are not wanting, however, that it might be entirely successful on selected ground. A number of instances have been observed where peach orchards, planted on the dry lands of the hills in different parts of this region, have flourished and bore regularly; at the same time that orchards in the warm valleys below rarely yielded crops, and the trees themselves were sometimes destroyed.

These cases show the importance of elevated sites. A dry, firm soil is, however, of great consequence. The influence of a compact knoll, rising but slightly above the rest of the field, has been observed to save from frost the corn which grew upon it; while on the more mucky or spongy portions of the rest of the field, radiating heat more freely, the crop has been destroyed. Cultivators of drained swamps have found it nec-

essary to plant such lands with tender crops two or three weeks later in spring than the usual period on upland. The successful cultivation of the peach and the grape, on the gentle swelling hills called *mounds*, in the Western prairies, while the crops are destroyed on the adjacent dark and porous soils of the plains, affords another example. Sometimes the effect of unfavorable soil more than overbalances that of situation. In some of the hilly parts of western New York, where the highest land is peaty, spongy, or springy, and the valleys dry and firm, the latter are found best for the peach.

The preceding facts furnish strong reasons for believing that, in large portions of the Northern States, where the cultivation of the peach has been entirely relinquished in consequence of the only attempts having been made in the warm valley, abundant crops might be regularly obtained by a proper selection of soil and locality. Even much farther south, the occasional destruction of tender fruits points out the great importance of careful attention to situation.

INFLUENCE OF DEEP LAKES AND RIVERS.—Large bodies of unfreezing water in the bottoms of valleys will reverse some of the preceding rules, and the banks of such waters are peculiarly adapted to the cultivation of tender fruits. They soften the severity of the cold, by the large and warm surface constantly presented; on the other hand, they chill the dangerous warm air which starts the buds in winter, and they afford great protection by the screen of fog which they spread before the morning sun. Along the borders of the lower parts of the Hudson, and on the banks of the Cayuga and Seneca lakes, tender fruit-trees often afford abundant crops, while the same kinds are destroyed only two or three miles distant. Along the southern shore of Lake Ontario, the peach crop scarcely ever fails, and the softening influence of that large body of unfreezing water extends many miles into the interior. The same result is observed in northern Ohio, bordering on Lake Erie; and in western Michigan, adjoining the great lake of that name.

Fruit-buds, as well as tender trees, are occasionally destroyed by thawing by the morning rays, after a cold night. The protection from these rays afforded by an eastern hill, buildings, or other screen, has led to the erroneous conclu-

sion that the destruction alluded to was caused by the *east wind*.

It has frequently been observed that when the lower branches of a peach-tree have been buried in a snow-drift, the crop thus covered was saved. This has suggested the successful practice of training peach-trees low, and covering the branches in winter with masses of evergreen boughs. The rigidity of the stems prevents their bending down; but as the roots are more flexible, laying down has succeeded by digging under on one side, the trees having been previously trained flat for this purpose.

In localities exposed to the sweep of winter winds, belts of evergreen or deciduous trees will be found of great service. In all instances where the side of an orchard, exposed to prevailing winds, is less successful and productive than the opposite side, proof is afforded that shelter would be beneficial; belts, especially if of deciduous trees, standing too near fruit-trees have, however, rather injured than benefited them. The orchards should be beyond the reach of their shade and roots, and be well exposed to sun and air.

ENCLOSURES.

The skilful cultivator, after having prepared his ground, procured the best trees the country affords, carefully transplanted them, and given them watchful and laborious attention for years, feels a very natural desire to partake of their fruits. But this he cannot do, in many places, unless his fruit-garden is protected from rambles of idle boys. It cannot be denied that our country is rather remarkable for its fruit-pilferers. It is feared it will continue to be so, until public opinion shall place the young man who steals a pocket-book, and the depredator of fine fruit, which has cost the owner as much care and labor, and which money cannot replace, on precisely the same level.

This formidable evil has deterred many from planting fruit-gardens. The most quiet and secure protection is afforded by a good barbed wire-fence. The English hawthorn, far to the north, will generally succeed quite well for this purpose. The buckthorn is extremely hardy, has a thick dense growth,

and is easily raised and transplanted; but, except on very rich soils and with good cultivation, it does not form a stout barrier. The Honey Locust is also very hardy, but requires more care in cutting back and thickening; it may, however, be made into an excellent hedge for a fruit-garden if the most thorny plants are selected. The Osage Orange, where the winters are not too severe, is also good. It is so liable to winter-kill, however, that hedges of it are often ragged and unsightly. It is densely armed with sharp thorns and if well kept soon becomes impassable. It is only hardy on dry ground or near the line of an underdrain.

Two reasons have operated in preventing a more general and successful adoption of hedges. One is the aversion so prevalent to undertake anything which does not produce immediate results, several years being required to make a perfect hedge. The other is the almost universal notion adopted without a moment's thought that everything in the form of a tree must grow and take care of itself. Hence we see for every good well-managed hedge at least one hundred bad and neglected ones. This remark applies with more force to the attempts made with the Osage Orange than with any other plant; for nothing that is ever used for hedges is more sensitive under bad usage or succeeds better if well treated than this. The privet and the buckthorn will usually present something of a hedgy appearance with any kind of management; but the Osage unless well cultivated and properly sheared will not exhibit even the semblance of a hedge. Hence the common notion that it has proved a failure.

The Osage Orange grows rapidly if well cultivated; and in order to insure a perfectly continuous and even hedge, the young plants must be allowed to swell their buds before they are set out, that all dead and feeble plants may be rejected. The first winter a light furrow should be ploughed upon it, to protect and drain it at the same operation. The soil should be kept deep and mellow by cultivation, at least four or five feet on each side, instead of allowing it to grow up with weeds and grass, as is usual; and, if possible, it should be placed nearly over a tile drain, which will contribute greatly to its endurance of winter.

Evergreen hedges are mostly employed as screens from ob-

servation and from winds; but as intruders scarcely ever attempt to pass where they cannot look through, perhaps they may yet be used as efficient barriers. The American Arbor-Vitæ is well adapted for this purpose, but like the buckthorn it will not grow well in the shade; hence when closely sheared



FIG. 80.



FIG. 81.



FIG. 82.

Trimming Hedges.

the interior branches are bare. Instead, therefore, of being sheared in the common way it should be shortened back. The close growth of a smoothly-shorn surface darkens and kills the interior foliage as shown in Fig. 80. Fig. 81 represents the same shortened back, or rather *thinned back*, admitting the light within. Fig. 82 shows how this is done, the cut being made at a fork *b*, or still shorter at *a*.



FIG. 83.—Badly Pruned Hedge.



FIG. 84.



FIG. 85.

The *hemlock*, although hardly stout enough for a hedge until it has grown many years, forms one of the most perfect and beautiful screens in existence, and it would prove a fine shelter for trees against the wind. Its fresh deep-green color is unsurpassed; and its denseness of growth in consequence of its quality of growing in the shade is scarcely equalled. The

Norway spruce will also make a fine hedge-tree. It grows with great vigor and may be freely shortened back.

Probably the very best shrub for making a handsome, quick-growing hedge is the California Privet (*Ligustrum ovalifolium*). It can be purchased from nurserymen eighteen inches to three feet high in lots of one hundred, at moderate prices. Set out from ten to twelve inches apart in good soil, it will, with proper cutting back each spring, form a dense hedge five or six feet high in a very few years. Three lines of barbed wire running through the middle will effectually prevent passing through it, and at the same time be entirely concealed.

The following figures (some of which are produced from those in *Warder on Hedges*) will show how this, and indeed all hedges, should be sheared.



FIG. 86.—Result of Omitting to Prune.



FIG. 87.—First Year, Newly Set Out.



FIG. 88.—Beginning of Second Year.

The neglect of cutting down at the commencement causes the hedge to become thin and narrow, and full of gaps at the bottom where it should be the thickest; and dense and impenetrable only at the top, where this is less essential. In other words, the hedge becomes wrong-side-up, or mounted on stilts (Figs. 83 and 84). The appearance of the young hedge just before cutting down the first time is shown at *a*, Fig. 85, and the cut portion at *b*. It is almost impossible to induce a novice to cut "this fine growth;" he thinks it will "ruin" his young and promising fence. Yet if the work is omitted, it will in a few years appear as in Fig. 86.

The following is the regular order of working each successive year. Fig. 87 represents the plant the first year, or a few weeks after setting out; it has been cut down nearly to the surface of the earth, the tap-root trimmed off, and the

young shoots as starting from it at *a*. It should grow untouched at least one year—some prefer two years, in order that the roots may become thoroughly established. Its appearance the beginning of the second year is shown in Fig. 88, when it is cut down again near the line, *b*, to thicken it at the

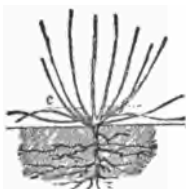


FIG. 89.—Beginning of Third Year.



FIG. 90.—Summer of Third Year.

bottom. The result of this cutting down is shown in Fig. 89, which is the same plant after further growth, and which is again to be cut down at the line *c*; this may be done in the spring of the third year, if the hedge has been well managed and kept vigorous. This shearing will not be more than four or five inches high. Nervous people "cannot bear" thus to cut down their beautiful growing hedges—and of course never have a good one. But if the work has been unflinchingly done, the hedge will present by early summer of the third



FIG. 91.—Beginning of Fourth Year.

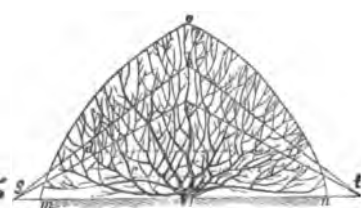


FIG. 92.—End of Fourth Year or Beginning of Fifth.

year, the fine broad-based, thickened appearance at the bottom, as represented by Fig. 90. The next pruning, to be done at the beginning of the fourth year, is shown in Fig. 91, as indicated by lines meeting at *e*, when the hedge for the first time begins to assume the form of a roof. The previous shearings (or rather mowings) are shown by the dotted lines *c* and *d*. Fig. 92 shows the subsequent cuttings—first by the lines meeting at *h*, and afterward at *o*. The latter may be

straight, as the previous ones, or in the form of a gothic arch, as shown by the figure. This brings the hedge to the close of the fourth year, when it will begin to form an efficient barrier, if it has been well cultivated and pruned. Its breadth at bottom will be nearly double its height. Future years will give it more height; but it must be especially observed to keep it always narrow at top, so that the foliage above shall not shade that below, nor injure the broad thick growth at bottom.

HOOKE TO TRIM HEDGES.—With a common corn knife, like

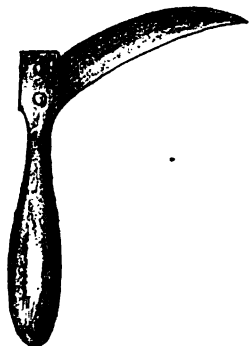


FIG. 93.—Corn Knife.

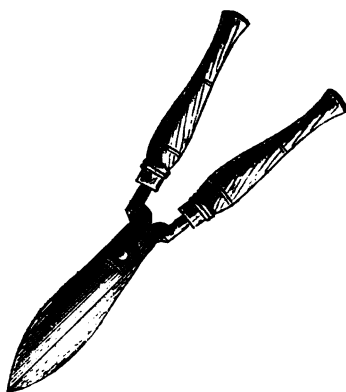


FIG. 94.—Hedge Shears.

that shown in Fig. 93, one man has trimmed from half to three-quarters of a mile of four years' hedge on both sides in a day—striking upwards and cutting it to a peak in the middle, like the roof of a house. Hedge shears, Fig. 94, may be had of any dealer in seeds, with which more neat and accurate work can be done.



CHAPTER V.

TRANSPLANTING.

ORCHARDS are usually set out, where the soil is good, with no other preparation than good ploughing. But where the soil possesses only moderate fertility, if the best growth and finest fruit is desired, it must receive additional preparation. When marketing and profit is the chief object, this preparation is of great importance, as the finest fruit often brings double the price obtained for that of common quality. The following directions are therefore worthy of attention.

PREPARING THE GROUND AND MANURING.—Ground intended for trees must be secure from danger of being flooded in wet seasons, and from all liability of becoming water-soaked beneath the surface. If not naturally dry enough, it must be thoroughly underdrained.

The next requisite is to deepen and enrich the soil by *trenching*, unless naturally or previously exactly fitted for trees. The same result may be attained by digging very large holes, say eight feet in diameter, and a foot and a half deep, and filling them with rich earth. But a better way is to plough the whole surface to nearly that depth, and to enrich it well by manuring. A common plough will descend six or seven inches; by passing another plough in the furrow—that is, by trench-ploughing—the soil may be loosened to ten inches or a foot. But by means of a good subsoil-plough in the common furrow, a depth of fifteen to eighteen inches may be reached. Now, to work the manure down to that depth, and make the whole one broad deep bed of rich soil, it must be first spread on the surface evenly after the whole has been well subsoiled, then harrow to break it fine, and mix it with the top soil, and then thrown down by a thorough trench-ploughing. For although the trench-ploughing can hardly be

worked a foot in depth of itself, yet after a good loosening with the subsoil-plough, it may be at once extended down a foot and a half. If this is done in the fall, and another good ploughing given in spring, the whole will be in fine condition for the reception of trees. Does this seem like a great deal of cost and labor? It is the very cheapest way of obtaining fine crops of the best fruit; for the strong, long, and healthy shoots which will run up even the first year, and the size, beauty, and richness of the fruit soon afforded from such an orchard, kept well cultivated during its early years, will astonish those who have never seen any but slipshod culture.

In setting out large orchards, if the whole field cannot be deepened, a strip of land ten feet wide extending across the orchard may be treated in the same way, in the centre of which each row is to be set; and the intermediate spaces, constituting two-thirds or more of the whole, may, if necessary, be prepared afterward, by the time the roots have passed the boundaries of the first.

LAYING OUT ORCHARDS.

Every one will admit that an orchard handsomely laid out in perfectly straight rows is in every respect better than where the trees are in crooked lines. An owner can feel no pride in giving proper cultivation to an awkwardly planted orchard; and trees standing out of line will be a constant annoyance to every ploughman who is in the practice of laying perfectly even furrows.

Some planters take great pains in setting their trees, so that one tree at the end of the row will hide all the rest when the eye ranges through the line. But in securing this desirable object, a great deal of labor is often expended in sighting in different directions while setting each successive tree, so that every row may be straight every way. The following mode of laying out and planting will not require one-twentieth of the labor commonly devoted, may be performed under the direction of any common workman, and will give rows that will range perfectly, not only in both directions, but diagonally. The writer has found that two men would thus lay out from thirty to forty acres in a day, with perfect precision for planting.

The first thing to do is to procure as many short pins or stakes, a few inches long, as there are to be trees in the orchard. These may be made by simply splitting short blocks or boards with an axe, say half an inch in diameter; or corn-cobs will answer a good purpose, and may be more easily seen. Then procure a strong cord as long as one side of the orchard, or, if the orchard is very large, as long as each section may be, if necessary to divide it. Then, with a pole or other measure, mark off the distances of the trees on this line, sticking a common brass pin through at each place for a tree, bending

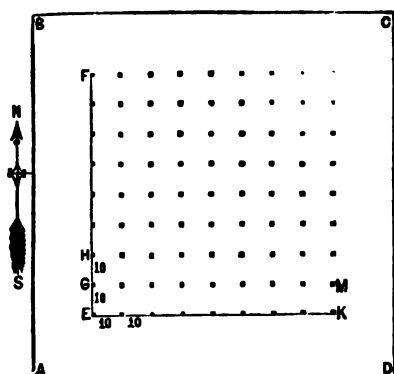


FIG. 95.—Staking out Orchards.

it around the cord so that it will not come out. Red yarn sewed through and tied around the cord would be more visible than pins; but the latter are quickly found if the workman measures the distance by pacing between them as he walks from one to the other. A new cord will stretch a little at first, but will soon cease to do so. The easiest way to mark the

spaces on the cord is to wrap it around the ends of a board cut at the right length, so that every third coil shall be a place for a pin. Thus, if the board is five feet long, by marking every third coil at the end of the board we obtain spaces of thirty feet. The field having been ploughed and fitted for planting, we are now ready for operation. Select a still day, so that the wind will not blow the cord out of place, and then stretch the line along one side of the field, at a suitable distance from the fence where the first row is to be. Make it as straight as possible, by drawing on it forcibly; a stout cord being better than a weak one on this account. If the land be tolerably level, twenty or thirty rods may be measured off at a time. Place flat stones or other heavy weights upon it at intervals, to keep it in position; if there is some wind, care will be necessary in making it perfectly

straight before thus fixing it. Next, drive in one of the short pegs or sticks at each point marked by the pin already described. When this is done, one row will be marked. Then remove the line, and mark each end of the field at right angles to this in the same way. Lastly, mark the remaining side. Before marking both ends, it is safest to stretch the line on the fourth side, that all may be accurately spaced. Next, to fill up this hollow square with the proper marks, stretch the line successively between corresponding sticks on the opposite sides, and mark as before till the whole is completed. If the work has been carefully done, every stake will be found to range perfectly. Every cord will stretch more or less, but if stretched so that the ends will come out even each time, which is attended with no difficulty, the rows will be perfect, as shown in Fig. 95.

Next take a strip of board, say about eight feet long and six inches wide, as shown in Fig. 97, and cut a notch in one



FIG. 96.



FIG. 97.

Tree Markers.

side at the middle, just large enough to let in the stem of a tree. Bore a hole through each end, exactly at equal distances from this notch. Then, whenever a tree is to be planted, place the middle notch around the peg, and thrust other pegs through the holes at the ends. Then take up the board, leaving these two pegs, dig the hole, replace the board, and set the tree in the notch. Proceed in this way till the whole orchard is planted. It is obvious that the trees will stand precisely where the first pegs were placed, and will range in perfect rows. A large number or series of the two pins may be set successively by the board, so that a number of workmen may be digging and planting at the same time. It is of no importance in what direction the board is placed, as the pin and the tree will occupy the same spot, as shown in Fig. 97, the row extending from *a* to *b*.

TRANSPLANTING.—Very few fruit or ornamental trees ever remain where they first came up from seed, but nearly all are

removed one or more times, to the spot where they are finally to remain. For this reason, transplanting becomes a most important operation. If a tree could be removed with all its roots, including the numerous threadlike radicles, and all the spongelets, and placed compactly in the soil, precisely as it stood before, it would suffer no check in growth. The nearer we can approach this condition, therefore, the greater will be our success.

As a general rule, roots extend as far on each side of the

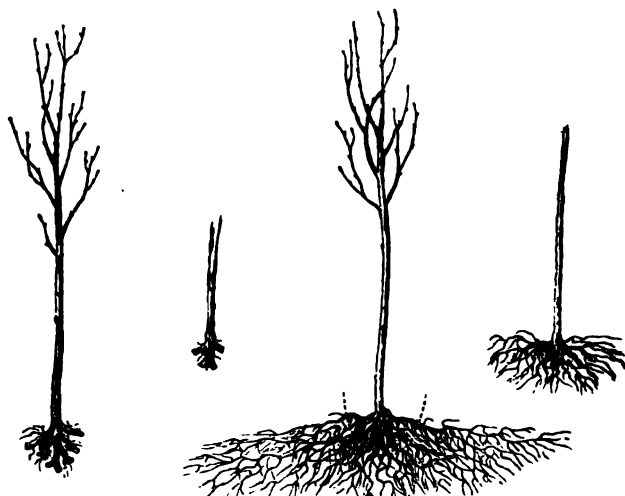


FIG. 98.

FIG. 99.

FIG. 100.

FIG. 101.

Modes of Digging Nursery Trees.

tree as the height of the tree itself. If, for instance a tree be five feet high, the roots will be found to extend five feet on each side, or to form a circle ten feet in diameter. This rule will not apply to slender trees, which have become tall by close planting, but to those that are strong and well developed. The great length of the roots is often shown by trees which send up many suckers, as the silver poplar and locust, which may be seen to extend over a circle much greater in diameter than the height of the tree.

Many persons "wonder" why trees are so much checked in growth by common transplanting, or why they so often die from the operation. They would not be surprised, if they saw

the common destruction of the roots in taking them up. Fig. 100 represents a nursery tree with its roots entire; the dotted lines show where the spade is commonly set for the purpose of lifting; Fig. 98 is the tree after taken up, when more than nine-tenths of the roots are cut off—sometimes it is as badly mutilated as in Fig. 99. Fig. 101 exhibits the same as removed by careful nurserymen.

In taking up the tree, the spade should be set into the earth at a distance from the tree, and the whole carefully lifted, not forcibly withdrawn, from the soil. Or, so much of the earth should be separated in a circle by the spade, that when the tree is withdrawn, a large portion of the soil may be lifted with it with the small fibres. In the following figure, *a* indicates the trunk of the tree; *bb* the circle of roots cut off with the spade in a hasty removal; and without this circle, the rest of the roots which are left in the earth (Fig. 102). The same is shown by the dotted lines in Fig. 100.



FIG. 102.

In ordinary or even very careful practice, a part of this wide network of fibres must necessarily be separated from the tree. It is evident then, that the usual supplies of sap to the leaves must be in part cut off. Now the leaves are constantly (during day) throwing off insensible moisture into the air; and good-sized trees thus give off daily many pounds. Reduce the supply from below, and the leaves cannot flourish; and if the reduction is severe, the tree withers and dies.

The remedy consists in lessening the number of leaves, so as to correspond with the diminished supply. This may be done by shortening back every shoot of the previous year to one-quarter of its length, and in extreme cases every shoot may be shortened back to *one strong bud*, just above the previous year's wood. Cutting off large branches at random often quite spoils the shape. Fig. 103 represents an un-

pruned tree, and Fig. 105 the same with the shoots shortened back.

Where peach and other trees have been once a year trimmed up to a single stem, while in the nursery, the mode of shortening is shown by Figs. 105 and 106.

A few experiments only are needed to convince any one of the advantages of thus cutting in the shoots. Some years ago an orchardist carefully transplanted one hundred and eighty apple-trees into good mellow soil. The roots had been cut rather short in digging. One-half had their tops shortened back, so as to leave only one bud of the previous season's wood;

the heads of the other half were suffered to remain untouched. The season proved favorable. Of the ninety which had their heads pruned, only *two* died, and nearly all made fine shoots, many being eighteen inches long. Of the ninety unpruned, *eight* died;

most of them made but little growth, and none more than six inches. Both the first and second year, the deep green and luxuriant foliage of the pruned trees afforded a strong contrast with the paler and more



FIG. 104.—Pear-Tree Pruned.

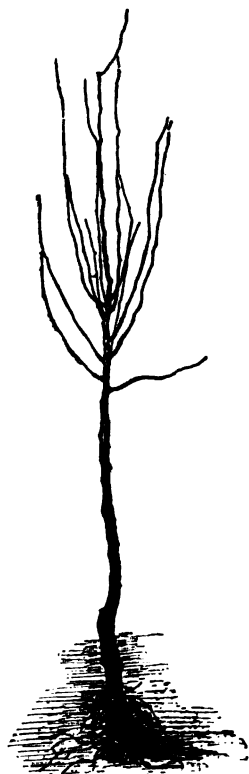


FIG. 103.—Three-Year-Old Pear-Tree.

feeble appearance of the others. A similar experiment was made with seventy-eight peach-trees, of large size, three years' growth from the bud. One-half were headed back; the rest were

unpruned. The season was rather dry, and *twelve* of the thirty-nine unpruned trees perished; and only *one* of those which were headed back. The unpruned which survived lost parts or the whole of the upper portions of their branches; the pruned made fine bushy heads of new shoots. In another instance, trees only one year's growth from the bud, transplanted in the usual manner unpruned, were placed side by side with others of four years' growth, and with trunks an inch and a half in diameter, the heads being pruned to one quarter their size. The growth of the former was feeble; the large trees, with pruned heads, grew vigorously.

The degree to which this shortening should be carried must depend much on climate. In the cool, moist atmosphere of England, the leaves perspire less, and a larger number may remain without exhausting the supply from the roots.

In this country the perspiration is more rapid, and fewer leaves can be fed, until new roots furnish increased supplies.

Cutting back after the buds have swollen, or the leaves expanded, seriously checks growth, and should never be performed except on very small trees, or on such as the peach, which quickly reproduce new shoots.

Trees which quickly reproduce new shoots, as the peach,

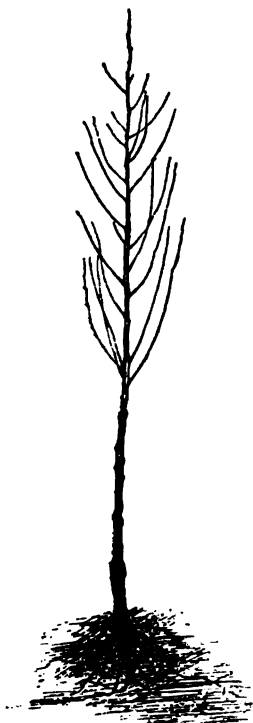


FIG. 105.—Yearling Peach-Tree.



FIG. 106.—Peach-Tree, Pruned.

may be more closely shortened back than others having a less reproductive power, as the apple. The cherry throws out a new growth still more reluctantly, and hence more care is needed in digging up the roots entire.

Preparing the roots.—Before a tree is set in the earth, all the bruised or wounded parts, where cut with the spade, should be pared off smoothly, to prevent decay, and to enable them to heal over by granulations during the growth of the tree. Then dip them in a bed of mud, which will coat every part over evenly, and leave no portion in contact with air, which accidentally might not be reached by the earth in filling the hole. The bed of mud is quickly made by pouring into a hole a pail of water, and mixing it with the soil.

Setting the tree.—It should not be set deeper than it stood before removal. Setting it upon the surface of the ground without any hole, and placing a bed of fine earth upon the roots to the usual depth, is preferable, and on shallow or unprepared soils, or such as are quite clayey and rather wet, has been quite successful. When placed in the unfilled hole, if it is found to be too deeply sunk, a mound or hillock is to be made under the centre to raise it sufficiently, and the roots separated and extended to their full length. Fine rich mould is then to be sprinkled or sifted over, taking care to fill all the interstices, and using the fingers to spread out all the fibres during the operation. The mellow earth should rise two or three inches above the surrounding surface, to allow for its subsequent settling.

Stiffening against the winds.—Newly-planted trees, being acted on as levers by the wind, often press aside the earth about their stems, and make an opening down to the roots, which in consequence suffer from both drouth and disturbance. There are two ways to prevent this disaster. In autumn transplanting, the best way is to embank a mound of earth about the stems, from ten to eighteen inches high, as the size of the tree may require, Fig. 107. This mound performs the triple office of stiffening the tree, excluding mice, and covering the roots from frost. Only a few seconds are required to throw up one of these conical heaps of earth. After the tree commences growing, the mounds are removed. Trees which have had their heads lightened by the shorten-

ing process already described will not often need any other protection.

But when the trees are large, or the situation is windy, *staking* becomes necessary. If driven before the roots are covered, the stakes may be erect, as in Fig. 108; if driven afterward, they



FIG. 107.



FIG. 108.

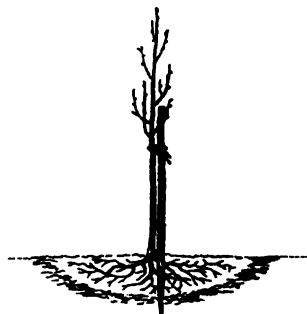


FIG. 109.

Transplanting Trees on the Surface.

may be slanting; and in both cases straw bands should be first wrapped once round, to prevent the trees from chafing.

The accompanying figure (109) shows the mode in which the stake is driven into the bottom of the hole before filling in.

Transplanting trees on the surface.—On another page the advantages are pointed out of sometimes setting trees on the sur-

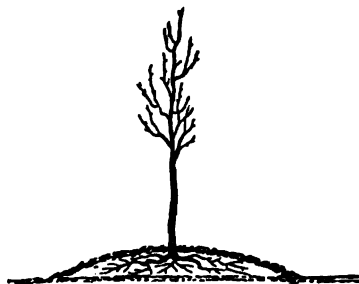


FIG. 110.

face of the soil. This mode of transplanting is undoubtedly the best on all heavy soils that cannot be thoroughly drained. The annexed figure (110) exhibits distinctly this mode of planting, the dotted line indicating the common surface of the earth, on which the tree is set, and the low mound raised upon the roots.

This not only gives the roots a deeper soil, but prevents the later from settling among them. By throwing the furrows occasionally toward the rows, the raised surface will be maintained, and a furrow left between for drainage.

Watering.—A very common error is the belief that trees need frequent watering before they are in leaf. Deluging the roots while in a partially dormant state is as hurtful to trees as to greenhouse plants, and a continued repetition of it is almost certain death. When a plant is in a state of rapid vegetation, large quantities of moisture are drawn up by the leaves and thrown off; but while the buds are unexpanded, the amount consumed is very small. Fruit-trees sometimes remain with fresh and green branches, but with unswollen buds, till mid-summer. Instead of watering such at the roots, let the tops be wet daily at evening, and it will in nearly all cases bring them into active growth. When the tree is much shrivelled, wrapping it loosely in straw, or better in moss, and keeping the whole in a damp state, will in most cases restore it.

After the leaves are expanded, a more copious application of water becomes useful; but it should never be performed, as so frequently done, by flooding the tree at one time and allowing it to dry at another; or by pouring the water on the surface, which it hardens, and never reaches the roots. Keeping the soil finely pulverized, and, if necessary, with an additional shading of hay or straw thickly spread over the surface, will preserve a sufficient and uniform degree of moisture.

Watering the roots, even of fast-growing trees, will rarely become needful if the soil is deep and is kept mellow. But whenever it is performed, the surface earth should be thrown off, the water poured in, and the earth replaced. This will admit the water at once to the roots, and leave the surface mellow; while by watering the top of the ground, the water will perhaps fail to reach the dry soil below, but only serve to harden and bake the surface.

Mulching, or covering the ground about a tree with straw, coarse barnyard litter, or, what is still better, leaves from the woods, will in nearly all cases obviate the necessity of watering. It is an excellent protection against midsummer drouths, which so often prove destructive to newly transplanted trees after they have appeared in leaf, and is a good substitute for mellow culture in places where good cultivation cannot be given. It should never be omitted for newly set cherry-trees. A correspondent of the *Horticulturist* mulched fifty trees out

of one hundred and fifty, all of which had commenced growth alike. Those which were mulched all lived. Of the hundred not mulched, fifteen perished. The weather was hot and dry at midsummer.

Trees received from a distance, and injured by drying, should immediately have their roots coated by immersion in a bed of mud; and then the whole stems and branches buried in moderately moist earth for a few days. They will gradually absorb moisture, through the pores in the bark, and resume their freshness. Plunging into water, as sometimes practised, is more liable to induce decay by water-soaking.

Season for Transplanting.—Trees may be removed from the soil at any time between the cessation of growth in autumn and the swelling of the buds the following spring. The operation may be performed first in autumn with those which drop their leaves soonest; but any tree, when not growing, may, by stripping its leaves, be removed safely. If left on, they will invariably cause the shrivelling of the bark, in consequence of the large amount of moisture they are always exhaling, and which cannot be restored through the roots while they are out of the ground.

The rule must vary somewhat with circumstances. Tender trees, as the peach and apricot generally succeed best if set in spring, unless in a warm, dry soil in a sheltered place, and in a climate not severe. It may be added, that soils rather wet, or liable to become soaked with water before freezing, should never receive trees in autumn. The rule should be carried one step farther; such soil should never be set with trees at all. They are unfit until well drained. Much of the "bad luck" that occurs is from wet subsoils.

It is commonly best to dig up trees in the autumn from nurseries in any case, whether for fall or spring setting. If sent long distances, they will be on hand and may be sent out early. They may be heeled in, and be more effectually secured from freezing, than if standing in the nursery rows. In heeling in, select a dry, clean, mellow piece of ground, with no grass near to invite mice; dig a wide trench, lay in the roots sloping (Fig. 111) and cover them and half the stems with fine mellow earth; *fill in carefully and solid all the interstices among the roots*; doing this work imperfectly often results in loss; if well

performed, it never can. If much danger is feared from mice, it is better to place the trees erect in the trench (Fig. 112), and round up the whole surface about them; but, being more exposed in this position, they should be placed in a sheltered situation from the winds.

With the precautions above mentioned, it is, however, a matter of small consequence at which season trees are put out, provided the work is well done. It is *at least a hundred times more important to give them good mellow cultivation afterward.*



FIG. 111.—Heeling-in Sloping.



FIG. 112.—Heeling-in Erect.

Here is where so many fail. Some dig little circles about their trees, which is scarcely better. The whole surface must be cultivated. It is for this reason that trees often do best set in spring—because in one case the soil settles, hardens, and crusts through winter, but is left mellow after spring setting. This difference could not exist if the mellowing of the soil were properly attended to.

When the soil is a heavy clay, and holds water like a tub, tender trees are in great danger from autumn transplanting, unless provision is made for draining the holes, which may be effected by running a deep furrow from one hole to the other, along the line of trees, and using brush, corn-stalks, or straw, as a temporary underdrain for the water to soak away.

Transplanting may be performed in winter, whenever the ground is open and the air above freezing; but roots which are frozen while out of the ground will perish unless they are buried before thawing.

The *size* for transplanting must vary with circumstances. Five to six feet high is commonly large enough, but those

much larger may be successfully removed if they have been previously prepared by shortening the long roots to induce the emission of a mass of smaller fibres near the centre or stem. This is done one year previously, by running a spade into the earth in a circle about the foot of the stem, if the tree yet stands in the nursery, or by cutting a circular trench around the tree if it is a large standard in open ground.

On a review of the essential requisites for successful transplanting, they may be summed up briefly as follows:

1. A previous preparation of a rich deep bed of mellow earth to receive the roots, and land which cannot be water-soaked.
2. Removing the tree with as little mutilation of the roots as practicable.
3. Paring off the bruised parts.
4. Shortening-in the head, in a greater or less degree (before the buds swell), to correspond with the necessary loss of roots.
5. Immersing the roots in mud.
6. Filling the fine earth carefully among the roots, spreading them all out with the fingers.
7. Planting no deeper than before.
8. Staking or embanking, when necessary, to prevent injury by the wind.
9. Watering the stems and branches only, before the appearance of the leaf.
10. Mulching, where danger of midsummer drouth is feared.

The following additional rules, self-evident to men of experience, are continually disregarded by novices in setting out orchards and fruit gardens:

1. If the roots of a tree are frozen out of the ground, and thawed again in contact with air, the tree is killed.
2. If the frozen roots are well buried, filling all cavities before thawing any at all, the tree is uninjured.
3. Manure should never be placed in contact with the roots of a tree, in setting it out, but old finely pulverized earthy compost answers well.
4. A small or moderate sized tree at the time of transplanting will usually become large and bearing sooner than a larger tree set out at the same time, and which is checked in growth by removal.
5. To guard against mice in winter with perfect success,

make a small, compact, smooth earth mound nearly a foot high, around the stem of each young orchard tree.

6. The roots of a tree extend nearly as far on each side as the height of the tree; and hence to dig it up by cutting a circle with a spade half a foot in diameter, cuts off more than nine-tenths of the roots.

7. Watering a tree in dry weather affords but temporary relief, and often does more harm than good, by crusting the surface. Keeping the surface constantly mellow is much more valuable and important—or if this cannot be done, mulch well. If watering is ever done from necessity, remove the top earth, pour in the water, and then replace the earth—then mulch, or keep the surface very mellow.

8. Shrivelled trees may be made plump before planting, by covering tops and all with earth for several days.

9. Young trees may be manured to great advantage by spreading manure over the roots as far as they extend, or over a circle whose radius is equal to the height of the tree, in autumn or early winter, and spading this manure in spring.

10. Never set young trees in a grass field, or among wheat, or other sowed grain. Clover is still worse, as the roots grow deep, and rob the tree-roots. The whole surface should be clean and mellow; or if any crops are suffered, they should be potatoes, carrots, turnips, or other low-hoed crops.

11. Constant, clean, and mellow cultivation is absolutely necessary at all times for the successful growth of the peach-tree, at any age; it is as necessary for a young plum-tree, but not quite so much so for an old one; it is nearly as essential for a young apple-tree, but much less so for an old orchard; and still less necessary for a middle-aged cherry-tree.

Registering Orchards.—Much inconvenience and often many mistakes arise from not preserving the names of varieties in young orchards. The trees are received, correctly labelled, from the nursery; the labels are left on till the wires cut the limbs, or until effaced by time, and the sorts are forgotten. Always draw on paper a plan of the orchard, marking the place of each tree and its name; it saves much subsequent confusion when labels are lost.

DISTANCES FOR PLANTING TREES.

Persons about to plant orchards and fruit-gardens are often at a loss to know the most suitable distances to place the trees. The guiding rule should be to allow space enough that when the trees attain full size, the sun's rays may freely enter on each side. The roots as well as the tops should have free space. As a general rule, the tops should never approach nearer than one-half their diameter.

Some varieties of the same kind of fruit grow to a much greater size than others, but as an average the following distances may be adopted:

Apples.—In fertile districts of the country, where the trees may attain great size, and where there is plenty of land, forty feet is the greatest distance required. The usual distance is two rods or thirty-three feet. Where the most is to be made of the land, and where thinning-in the limbs is practised when the trees become too large, twenty-five feet distance may be adopted. It is an economical plan to set apples thirty feet apart and a pear between; for ten or fifteen years, at least, they can all grow together, and if then too thick such as are least desirable may be cut out. It saves much room and gives more fruit to the acre while growing. For pyramids on apple-stocks, fifteen feet for pyramids or dwarf standards on Doucin stocks, ten feet; for dwarf round-headed trees on Paradise stocks, eight feet.

Pears.—Large growing standard varieties, on pear-stocks, twenty to twenty-five feet; dwarf standards on quince (with stems pruned up, two or three feet, the heads with natural growth, or slightly thinned by pruning but once a year, for orchard culture), twelve feet; pyramids on pear stocks, twelve to fifteen feet; on quince, ten or twelve feet. It should never be forgotten that pears on quince should be so placed as to admit of high or enriching cultivation.

Peaches.—It is usual to allow about twenty feet for peach-trees that are never shortened-in, but permitted to spread out and take their natural course. But if shortened-in annually as they should be, or even triennially, by cutting back three-year branches, they may occupy only twelve or fifteen feet. Peach-

trees budded on the plum, which reduces their growth a little, may be kept cut back so as to require a space of only eight or nine feet.

Cherries.—Common standards, twenty feet apart; pyramids on common stocks, fifteen feet; on Mahaleb stocks, ten feet. Dukes and Morellos require only three-fourths of this space.

Plums.—Standards, fifteen feet; pyramids, eight to ten feet.

Apricots.—One-fourth more space than for plums.

Quinces.—Six to eight feet.

Grapes.—Most vigorously growing native sorts, on enriched soils, may be ten to fifteen feet apart; on a poorer soil, moderate growers may be six to eight feet apart.

Gooseberries and Currants.—Four to five feet.

Raspberries.—Three or four feet in rows five feet apart.

Blackberries.—In rows five feet apart.

For the above distances, the following is the number of trees required for an acre:

40 feet apart,	.	.	.	.	.	27 trees.
33 "	.	.	.	.	.	40 "
25 "	.	.	.	.	.	69 "
20 "	.	.	.	.	.	108 "
15 "	.	.	.	.	.	193 "
12 "	.	.	.	.	.	302 "
10 "	.	.	.	.	.	435 "
8 "	.	.	.	.	.	680 "
6 "	.	.	.	.	.	1,208 "
4 "	.	.	.	.	.	2,720 "

CHAPTER VI.

CULTIVATION OF THE SOIL.

IN passing through the country, and visiting the grounds of fruit-growers, and examining the exhibitions of pomological societies, a marked difference is observed in the same variety as grown on different grounds. In one case it is small and poor flavored; in another it is large, beautiful, rich, and excellent. The owner of the poor fruit is much disappointed in what he expected to see, and considers himself as "badly humbugged" by the nurseryman who sold him the trees. The successful cultivator takes his specimens to a fair, and sweeps off the premiums by their delicious quality and excellent appearance. Now, this question at once arises: What is the cause of this difference? And it is just such questions as we like to hear asked.

The first, and perhaps the most prominent cause, is *cultivation*. Place a tree in grass-land, or give it no cultivation—let the surface become baked hard, like flagging, or allow weeds to cover the surface—and the tree will have a feeble growth, and the fruit, as a necessary consequence, will partake of the condition of the tree. A feeble tree will, of course, bear small fruit. Hence, one reason why young trees often produce larger and finer specimens than old and stunted trees. Cultivation alone has often changed both size and quality in a surprising degree. Some years ago a few trees of the Seckel pear were observed to bear very small fruit—they were then standing in grass. Subsequently the whole surface was subjected to good cultivation. The next crop had pears at least triple the size of the former. A St. Ghislain tree, on another place, bore at first when standing in grass-land, and disappointment was felt by the owner at the small size and poor quality of the fruit. A herd of swine accidentally rooted up the grass and reduced the ground to a mellow surface. The pears that year were

greatly increased in size, and so much improved in flavor that they would not have been recognized as the same sort. The d'Angouleme when large and well grown, is an excellent fruit. When small, it is perfectly worthless. T. G. Yeomans, of Walworth, N. Y., who has been eminently successful in its cultivation, and obtained thirty-five dollars per barrel for it, has found high culture of vital importance, and has remarked that when the specimen does not weigh over four ounces, it is no better than a raw potato; and this, we think, has generally been found true. There is no question whatever that this fine pear, as well as many other fruits, has been placed on the rejected list by some planters for want of good management and proper cultivation.

Good cultivation and thinning the crop cause all the difference between those superb specimens of the pear which often grace the extended tables and fill the vast halls of our finest fruit exhibitions, and such miserable fruit as we sometimes see borne on the grass-grown, weed-choked, mice-gnawed trees of the slipshod farmer's grounds—planted out with hardly the expectation, but rather with a sort of dim hope that they would grow and take care wholly of themselves.

One of the best things that a horticultural or pomological society could do, would be to place conspicuously on exhibition a collection of such fruit as might be raised with every advantage resulting from good culture and judicious thinning; and another collection beside it with all the marks of small size and scabbiness which might be expected from utter neglect. One collection should be marked, "FRUIT RAISED UNDER THE EYE OF VIGILANCE AND INDUSTRY:" the other labelled, "FRUIT GROWN UNDER NEGLECT."

Cultivation is the more important, because it is not commenced and finished in a day, but needs constant attention for years; and in ordinary practice it receives greater neglect. For, of the thousands of trees which are every year transplanted in all parts of the country, the assertion may be made with safety, that *more are lost from neglected after-culture than from all other causes put together.*

To purchase and set out fine fruit-trees of rare sorts, in a baked and hardened soil, whose entire moisture and fertility are consumed by a crop of weeds and grass, might very aptly

and without exaggeration be compared to the purchase of a fine horse, and then perpetually to exclude him from food and drink.

Here is the great and fatal error with a large portion who attempt the cultivation of fruit. We may not incorrectly divide these into three classes:

1. Those who, having procured their trees, destroy them at once by drying them in the sun or wind, or freezing them in the cold, before setting out.
2. Those who destroy them by crowding the roots into small holes cut out of a sod, where, if they live, they maintain a



FIG. 113.—Neglected Trees.



FIG. 114.—Well Cultivated Orchard.

stunted and feeble existence, like the half-starved cattle of a neglectful farmer.

3. Others set them out well, and then consider their labors as having closed. They are subsequently suffered to become choked with grass, weeds, or crops of grain—some live and linger, others die under the hardship; or else are demolished by cattle, or broken down by the team which cultivates the ground.

The annexed illustrations are a fair exhibition of the difference in results between neglected management, as seen on the left, and good cultivation, on the right, as seen in trees five or ten years after transplanting (Figs. 113 and 114).

A neighbor purchased fifty fine peach-trees, handsomely rooted, and of vigorous growth; they were well set out in a field containing a fine crop of heavy clover and timothy. The following summer was dry; and a luxuriant growth of meadow-grass nearly hid them from sight. What was the consequence? Their fate was precisely what every farmer would have predicted of as many hills of corn, planted and overgrown in a thick meadow—very few survived the first year.

Another person bought sixty, of worse quality in growth; he

set them out well, and kept them well hoed with potatoes. He lost but one tree; and continuing to cultivate them with low-hoed crops, they now afford yearly loads of rich peaches.

Another neighbor procured fifty good trees. Passing his house the same year late in summer, he remarked: "I thought a crop of wheat one of the best for young peach-trees" "Just the reverse; it is one of the worst—all sown crops are injurious; all low-hoed ones beneficial." "Well," answered he, "I have found it so—my fifty trees all lived, it is true, but I have lost one year of their growth by my want of knowledge." On examination, they were found in excellent soil, and had been well set out. All the rows were in a field of wheat, except one, which was hoed with a crop of potatoes. The result was striking. Of the trees that stood among the wheat, some had made shoots the same year an inch long, some two inches, and a very few, five or six inches. While on nearly every one that grew with the potatoes, new shoots a foot and a half long could be found, and on some the growth had been two feet, two and a half, and even three feet. Other cases have furnished nearly as decisive contrasts. An eminent cultivator of fine fruit, whose trees have borne for many years, remarks: "My garden would be worth twice as much as it is if the trees had been planted in thick rows two rods apart, so that I could have cultivated them with the plough. Unless fruit grows on thrifty trees, we can form no proper judgment of it. Some that we have cultivated this season, after a long neglect, seem like *new kinds*, and the flavor is in proportion to the size."

The *thick rows* here alluded to may be composed of trees from six to twelve feet apart in the rows. This mode admits of deep and thorough cultivation, and the team can pass freely in one direction, until close to the row, where the soil need not be turned up so deeply so as to injure the roots. Fig. 115 exhibits this mode of planting, and Fig. 116 another mode, where the trees are in hexagons, or in the corners of equilateral triangles, and are thus more equally distributed over the ground than by any other arrangement. They may thus be cultivated in three directions. For landscape effect, this is undoubtedly better than any other regular order.

Trees are frequently mutilated in cultivating the ground with a team; to obviate this difficulty, arrange the horses

when they work near the line of trees, one before the other, or *tandem*. Let a boy ride the forward one, use long traces and a *short whiffletree*, and place the whole in the charge of a careful man who knows that one tree is worth more than fifty hills of corn or potatoes, and no danger need be feared. In

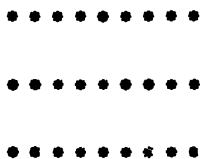


FIG. 115.

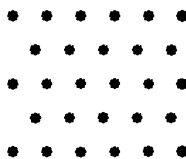


FIG. 116.

the absence of this arrangement, oxen will be safer than horses. A strong single horse will be sufficient for working near the rows, where the plough should run shallow, provided the soil is not hard.

The annexed cut (Fig. 117) shows a mode of constructing whiffletrees for this purpose, so as to pass the trees freely.

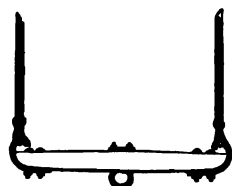


FIG. 117.—Orchard Whiffletree.

It is made as short as the free action of the animals' legs will allow (about sixteen inches for a single whiffletree). An iron strap is riveted so as to bend round the end of the wood, turning in and forming a hook inside.

In very small trees, most of the roots are within a few feet of the stem, but their circumference forms an annually increasing circle. Hence the frequent practice of applying manure, or digging the ground closely about the base, as exhibited in the annexed figure (118), is comparatively useless. Hence, too, the practice of ploughing a few furrows only on each side of a row of large trees in an orchard, is greatly inferior to the cultivation of the whole surface.

Among the crops which are best suited to young trees are potatoes, ruta-bagas, beets, carrots, beans, and all low-hoed crops. Indian corn with its shallow and spreading roots, and the culture usually given it, is a good crop for orchards. All sown crops are to be avoided, and grass is still worse. Meadows are ruinous.

A chief reason of the fatal effects of sown crops is in the

impossibility of mellowing the ground by repeated cultivation. For this reason, a low crop of peas has been found much worse than a heavy growth of Indian corn.

Renovating Old Trees.—When old trees become feeble, there

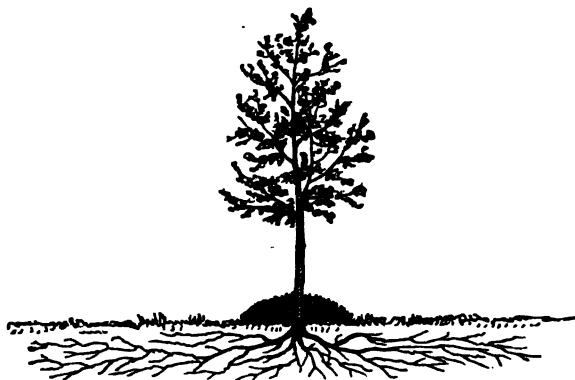


FIG. 118.—Faulty Manuring.

is no better way of imparting to them vigor than by *manuring*. Instead of adopting the more common practice of digging a circular trench around them and filling this with manure, the operation may be performed in a more perfect and efficient manner by digging narrow radiating trenches from within a few feet of the trunk, directly from it—this will prevent cutting many of the roots. The annexed diagram (Fig. 119) will show the position of these trenches. These may then be filled with a *compost* made of turf, stable manure, ashes, and perhaps a little bone manure—the turf to be the chief constituent, say one-half or two-thirds—and the ashes say one-thirtieth. The bone manure is not essential, as its constituent parts are in common manure in small quantities. If this is done in autumn, the roots will be prepared to penetrate it early in spring, and if the tree is not past recovery, it may make a new growth.



FIG. 119.—Diagram for Trenches for Renovating Old Trees.

The roots probably reach as far each way as the height of the tree, and the trenches should extend about the same distance. They need not be cut very near the tree, as the roots are all large there, and would be more likely to be injured and would be little benefited. The trenches should be only the width of a spade, and be from two to four feet apart.

Old apple orchards always grow and bear best when kept under cultivation. If the soil is, however, naturally or artificially fertile, they succeed well in grass continually grazed short by sheep and swine. These animals are useful in devouring the insects of the fallen fruit, and assist in manuring the surface. An annual autumn application of yard or stable manure, with a small portion of ashes—or, in the absence of ashes, of lime—will commonly be useful. If the orchard is only top-dressed, the application in autumn is of great importance, that the soil may be soaked in winter or spring. If ploughed in it should be done in spring, after the manure has remained all winter on the surface.

When to Manure Orchards.—Inquiry is often made as to the frequency and amount of manuring or cultivation for trees. The answer must be: *act according to circumstances.* The question again recurs: how shall we know what our soils need? The answer is: *observe the results of growth.* An examination or analysis of the soil will be of little use. But the trees will tell their own story. If the soil is so rich that they make annual shoots of two or three feet or more in length, without any cultivation or manuring at all (which, however, is rarely the case), then it will be needless to give additional care. *The annual growth is the best guide to treatment.* There are very few apple or other orchards which, after reaching a good bearing state, throw out annual shoots more than a foot or a foot and a half long, and many not half this length. The owner may lay it down as an unalterable rule, that when his trees do not grow one foot annually, they need more manuring or cultivation, or both. By observing the growth he can answer all questions of the kind referred to, without difficulty.

Management of Western Orchards.—Lewis Ellsworth, one of the most successful and intelligent fruit-growers in Illinois, says that the loss in fruit-trees in that State within the last three years is *millions of dollars*—that it is attributed to the

cold winters and dry summers. But he asserts that, to a great extent, this result has arisen from their standing *unprotected* in a soil underlaid with a retentive clayey-loam subsoil, which characterizes most of the prairie land. He has adopted the practice of ridging his land, by repeated ploughings, commencing at the same ridges and ending at the same dead furrows; and where nursery-trees were formerly thrown out by freezing, after ridging they stand throughout the winter without injury, and make a better growth in summer. He recommends the ridging system for all orchards, each row of trees being placed on the centre of the ridge.

We have no doubt that drainage would lessen the effects of severe winters on fruit-trees in other regions than the West.

Arrangements to Facilitate Cultivation.—The following is an arrangement of kinds of different sizes, into rows for cultiva-

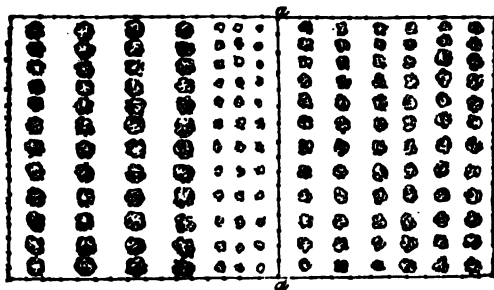


FIG. 120.—Fruit-Garden.

tion both ways with horse-labor (Fig. 120). The larger sorts are in wide rows, as explained on page 139. Fruits which are stung by the curculio are planted at one end, and when the fruit is forming, pigs and geese are confined to that part by the hurdle-fence *a a*, run across for the occasion.

A plan of a fruit-garden, arranged in a similar manner, with full details, is given on page 138.

Implements for Tilling Orchards.—It is important, after trees have begun growth in spring, to injure the roots as little as possible in cultivating. On this account a harrow which will ride over the roots without tearing them up is indispensable. A smoothing harrow operates in a similar way, forming a very smooth surface, and is therefore successfully employed

toward the latter part of the season for giving the ground a finish, to fit it for receiving the falling fruit, or for driving a wagon easily among the trees for gathering the crop. A hoe should be in constant use on the rows between the trees, and around their trunks, to keep down the weeds and grass, which the use of the harrow, or corn-plough, on the rest of the land will cause to grow most luxuriantly.

CHAPTER VII.

PRINCIPLES AND PRACTICE OF PRUNING.

A GREAT deal has been said and written on this subject, and much bad practice still prevails. Orchards are seen all through the country which have either been never pruned or, if the work has been performed, it has done more harm than good. Trees with trunks trimmed up to three times the proper height, mutilated by the needless lopping of large branches, one-sided and totally destitute of symmetry, or filled with a mass of brush, may be seen through the country. A perfect orchard is a rarity. The same remark will apply to nurseries. The trees have been grown and trained with very little attention to a perfect shape, the chief object of the owner being to raise large trees in as little time as possible. The purchasers of such trees, after setting them out, either give little attention, or, if they cultivate them well, allow them to form their own heads. They may be too tall or one-sided, or distorted and irregular, no attention being given to shaping the heads when they are young.

Pruning Young Trees at Transplanting.—When young trees are dug from the ground, the roots from necessity are more or less bruised or mutilated. All these bruised or torn surfaces should be pared off smoothly with a sharp knife. If left untouched they induce decay, and are unfavorable to the best healthy growth of the tree—in the same way that a broken or bruised limb above ground would furnish a dead stub or make a bad scar, while pruning it smooth will cause it to heal over readily. Most nurserymen prefer the pruning-knife, Fig. 121. for trees at this stage of their growth, considering that it makes a cleaner cut—but the pruning-shears, Fig. 95, now made make a drawing cut, which leaves a clear and unbruised surface, and can be used much more rapidly.

Pruning the Tops.—Thrifty young trees usually have roots

extending as far each way from the foot of the stem as the height of the tree. A careful examination will discover the



FIG. 121.—Forms of Pruning-Knives.

whole surface of the subsoil occupied with the small fibres of full-grown nursery-trees (Fig. 122). It is obviously impossible, therefore, in digging up to avoid cutting and leaving most of

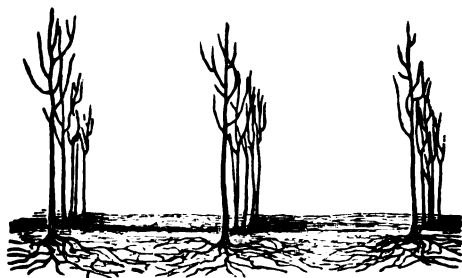


FIG. 122.—Nursery Rows—Roots extending under the whole surface.

the roots behind; and the tree when reset is unable to sustain or feed for a time its leaves and branches. A part must therefore be cut off to restore the balance, corresponding in some

degree with the loss of the roots. This may be done by thinning out all the feeble shoots, so as to leave an even, well-shaped head, and then cutting back a part of each remaining one-year shoot (Fig. 123). Judgment must be exercised as to



FIG. 123. — Figure of thinned and shortened - back young tree.

the amount to be cut away from the tops. The growth of new roots depends on the assistance afforded by the leaves at the top; if the leaves are too few, the roots will not extend freely; if they are too many, the roots cannot furnish proper supply for them, and they will be feeble and sickly. Planters will learn a great deal on this point by cutting away more or less on different trees, and observing the result. Different kinds of trees require varying management in this respect. The peach, for example, readily reproduces new shoots, and it may, consequently, be cut back very freely; two-thirds to nine-tenths of each previous season's shoot may be removed without detriment.

The grape, also, may be very heavily pruned, as it throws out new vines with great vigor. The cherry, on the contrary, is very sensitive, and young trees have been nearly killed by a severe summer pruning. The young cherry shoots should never be cut back in spring more than half their length. The pear and apple are intermediate, and the heads should be moderately and not severely pruned.

The mutual relation between the roots and leaves has been already alluded to. The leaves cannot exist without the moisture received through the roots; and the roots cannot grow without the nourishment afforded by the leaves. The only exception is the temporary supply furnished by the cells in the body of the tree. New roots are commenced before the leaves expand, as may be seen on young seedlings, the roots of which have been trimmed, and where the new white fibres protrude just as the buds are swelling. The same occurs on the roots of trees transplanted in autumn, after the leaves have fallen; but this effect is only temporary, continued growth requiring that both leaves and roots should work together. On the other hand, the nutriment laid up in the cells will sometimes supply the leaves for a short period, provided care is taken to furnish

the requisite moisture at their surfaces by means of a bell-glass to retain a damp atmosphere. Cuttings are often thus started, a small portion of leaves being allowed to remain upon them to assist in the emission of new roots. But, if the leaves are placed in a dry air, they soon pump out and carry off the moisture, and the shoot, leaves and all, withers in a short time. If all the leaves had been cut off, the shoot would remain plump much longer—a fact well known to nurserymen and others who reserve scions for budding.

Proper Time for Pruning.—Many cultivators have been misled into the opinion that early summer is the best time to prune, from the fact that the wounds heal more readily. Pruning after the tree has commenced growth has a tendency in nearly every instance to check its vigor. For this reason, where the rapid formation of young wood is desired, the work must be performed *before the buds begin to swell*. Some planters have objected to shortening-in the shoots of newly set trees, because by doing the work too late, or after the leaves were partially or wholly expanded, they have injured and not benefited them. Any



FIG. 125.—Head of Young Tree pruned after the leaves had expanded.



FIG. 124.—Head of Young Tree pruned before the leaves had expanded.

one may easily satisfy himself on this point by pruning-back the heads of a dozen trees early in the season, and leaving those of another dozen until the leaves have opened. They will present the appearance represented in the following figures, before the close of summer—the first (Fig. 124), with strong, thrifty shoots: the latter (Fig. 125), with short, stunted growth. There may be an exception to this general rule, where a slight amount of pruning in summer, not sufficient to produce any material check in growth, may be useful in improving the shape of the tree; such, for example, as the removal of an occasional unnecessary shoot or one-sided branch.

As fresh wounds always render trees more liable to be affected by intense cold, quite hardy trees only may be pruned any time during winter. On those inclining to be tender the operation should be deferred till toward spring.

Pruning, as Affecting Fruitfulness.—As a general rule the rapid formation of leaves and wood is adverse to the production of fruit. On the other hand, the slow growth of the wood favors the formation of fruit-buds and the production of heavy crops. These two adverse tendencies may be more or less controlled by pruning.

When the too numerous branches of a tree produce more leaves than can be properly supplied with nourishment, resulting in a feeble or diminished growth, new vigor may be often imparted by judicious pruning, directing the sap into a smaller number of channels, and thus increasing its force; for example—peach-trees, after bearing some years and yielding smaller fruit than on fresh young trees, will assume all their former thriftiness by partly cutting-back the heads. Dwarf pear-trees, which have not been sufficiently manured and cultivated, whose pruning has been neglected, and heavy bearing allowed for a number of years, have been restored by severely pruning-back the branches and thinning out the fruit-spurs. In all such operations as these, it is indispensable to observe the rule already given, to do the cutting-back in winter or early in spring, before the buds have swollen. If trees are too thrifty and do not bear, a check may be given, and many of the leaf-buds thus changed to fruit-buds by a continued pinching-back during summer.

The production of fruit-buds may be accomplished artificially by checking the growth of vigorous trees; but such treatment, out of the ordinary course of nature, though sometimes useful, should be cautiously applied, as the first crop gives still another check, and often materially injures the tree and the quality of its subsequent crops.

Summer Pruning.—Another and an unobjectionable mode of attaining the same end, is *summer pruning*, which is effected by pinching off the soft ends of the side-shoots after they have made a few inches growth. In these the sap immediately accumulates, and the young buds upon the remainder of these shoots, which otherwise would produce leaves, are gradually

changed into fruit-buds. To prevent the breaking of these buds into new shoots by too great an accumulation of the sap, a partial outlet is left for its escape through the leading-shoot of the branch, which at the same time is affecting the desired enlargement of the tree. In the annexed figure (Fig. 126), a branch is represented with its side-shoots thus undergoing conversion into fruit-spurs, the dotted lines showing the position which these shoots would have taken if left unpinched.

It will be seen that two great objects are here attained—the fruitfulness of the tree, and the increased vigor of the leading-shoot, by directing the surplus sap to its growth.

This constitutes essentially the art of *summer pruning* dwarf and pyramidal trees, more especially the pear and apple. It may be applied with advantage to young standards, to produce early fruitfulness.

It often happens, and especially when the pinching is done too early, that the new buds send out shoots a second time the same season. When this occurs, these second shoots are to be pinched in the same manner as the first, but shorter; and third ones, should they start, are to be similarly treated. The bruising given by pinching off with the thumb and finger is more apt to prevent this result than clipping with a sharp knife.

Giving Desired Form to Trees by Pruning.—A tree may be moulded into almost any desired shape by a proper use of the knife, or even by the rubbing and pinching process.* If a young tree from the nursery is too tall and slender, or has too high a top, it should not be altered much the first year after removal, but allowed to become tolerably established with its new set of roots. The second year it may be cut back freely (Figs. 127 and 128), taking care to leave buds for the formation of an evenly distributed head. Some kinds of trees will



FIG. 126.—Summer Pruning.

* A late writer says: "The finest standard pear-trees we ever saw, had never had a knife or saw about them. The thumb and forefinger had only been used. Rub off all unnecessary buds that grow in a tree—and remove as they appear. This keeps the tree clean, and the growth in the proper channels. It is easily done."

bear cutting-back freely the same year they are removed, as for example, the peach, which, as already observed, readily produces new shoots. The same characteristic is possessed

by the sugar-maple and some other trees, which, as many have observed, when planted along the borders of streets, and cut back to single poles, form heads at once of new branches.

When the tops are too low (which is rarely the case), the lower branches may be pruned off and the top carried up to any desired height. This should not be done until the stem has thickened sufficiently to sustain the top—the side-shoots always tending to increase the diameter of the stem which bears them. If the young tree possesses great luxuriance it may be desirable to throw more of the growth upward than these side-shoots would allow, if remaining till the



FIG. 127.—Mode of Reducing the Height of a young tree by cutting at the dotted line.



FIG. 128.—The same, after the operation is completed.

following spring, the usual time for pruning. In such a case the ends of the side-limbs may be clipped or pinched off, and a portion of the lower ones removed with the knife.

Pruning Nursery and Young Trees.—Brief suggestions have been already furnished on this subject in connection with the explanation of general principles. Directions of a more minute and practical character, and applicable to the different kinds of trees, will doubtless be useful and acceptable. It is of great importance that a tree be pruned right, on the start; for the misplaced shoot, which might be easily rubbed off with the finger, when just beginning to grow, many ultimately become the heavy limb and the misshapen top.

Pruning Single Shoots.—Young shoots are cut back for various purposes, such as heading-down to an inserted bud, shortening-in those that are too long, or cutting out super-numeraries. It is important that even these simple operations

be rightly performed. 1. The cut is usually made with a sharp knife, which does the work smoother, better, and more completely at the control of the operator. 2. The cut surface should be as small as practicable, in order that it may heal over readily.

The two annexed figures show the right and the wrong way of doing this work, Fig. 129 being a well-made cut and Fig. 130 being one performed by a careless workman, exposing a large cut surface and leaving an inconvenient and sharp stub

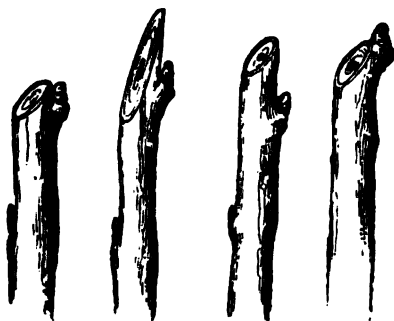


FIG. 129. FIG. 130. FIG. 131. FIG. 132.

above the bud intended to grow. 3. The cut should not be made too high above the bud, nor too near it. If too



FIG. 133.—Pruning Down to Insert Bud. — The dotted line, *a*, shows the proper place to make the cut—*b*, is too near the bud.



FIG. 134.—The Bud after starting and tying up.

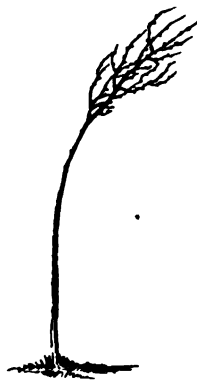


FIG. 135.—Nursery-tree Pruned too High.

high above (Fig. 131), in the space between the buds or joints, this portion, not being fed by leaves, dies, and the wood must be afterward pruned again in order to make a

stocks, the heads should be about twenty inches or two feet high.

Pyramids.—For pyramids (a form of training applied most frequently to dwarf pears), the early treatment is quite different from that of standards. As the sap tends to the summit of the tree, producing the strongest side-shoots toward the top, and the shortest and most feeble toward the bottom, the natural form of the tree gradually becomes a trunk or stem with a branching head. To prevent this result, and give a strong, broad set of branches at the bottom, a thorough and regular system of shortening-down must be adopted at the outset. The following is a brief outline of the course usually pursued:

After the single shoot from the bud has grown one season (Fig. 140), it is cut down so as to leave not over one foot, and



FIG. 140. FIG. 141. FIG. 142.

if the tree is weak not over six inches (Fig. 141). As a consequence, the buds on this remaining portion, receiving all the sap, make a vigorous growth. The upper one must be converted into a leader, by pinching off early the tips of the others, beginning first with the upper ones, which will be

the strongest, and gradually descending as the season advances to the lower ones, which should be left the longest in order to give them the most strength (Fig. 142). Six inches of naked stem below the branches should be left, by rubbing off all shoots below; and if in a region liable to deep snows, this space should be a foot, to prevent splitting off the limbs by the weight of the snow, and for which object the tree should not be cut down lower than eighteen inches at the close of the first season. The pruning after the second year's growth, consists in cutting down again the leader for a second crop of side-shoots; and these side-shoots, and the new leader, are to be treated precisely as those below were treated the year before. At the same time, the last year's side-shoots, on the lower part, are to be cut back (the longest at the bottom so as to give a pyramidal form), in order to insure the growth of the buds upon them. The new side-shoots thus caused may

be pinched off so as to convert them into fruit-spurs (according to the process described hereafter in this chapter), except one shoot left on each as a leader, and another, if needed, to fill up the space made by the widening limbs. The pyramid may now be said to have been fairly formed; and it is only requisite to continue and prolong the same process for successive years. Fig. 143 represents a four-year pyramid three times pruned, each section being shown at the figures 1, 2, 3,



FIG. 143.—Four-year Pyramid.

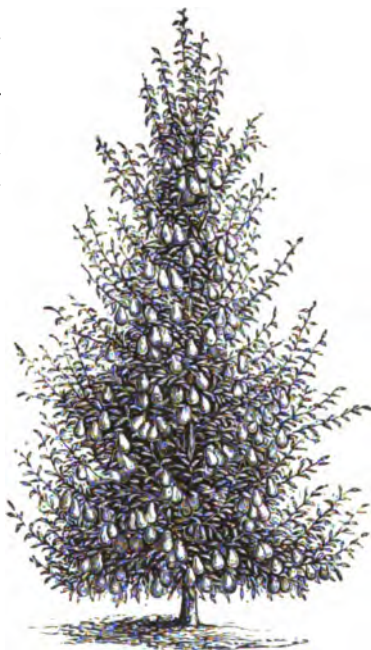


FIG. 144.—Bearing Dwarf Pear.

and the cross-lines indicating the place for the fourth pruning. Fig. 144 represents a perfectly pruned pyramid in bearing.

After the tree has attained sufficient size, its further extension is prevented by pruning back the shoots.

If the fruit-spurs become too numerous, a part of them are to be pruned closely out, so as to give an even and not crowded crop. When spurs become too old, they may be mostly removed for new ones to spring from their bases.

Some varieties of the pear throw out side-shoots spontaneously the first year. Such trees may be treated in a manner not unlike the ordinary two-year pyramid. On the contrary,

such sorts as have small or flat buds may need a more severe cutting-back than others, in order to arouse the buds into action and induce them to break into shoots.

T. G. Yeomans, a successful cultivator of the dwarf pear for market, gives the following excellent practical directions for pruning the trees, suited to orchard management:—

“Experience has convinced me, that with good trees of well-chosen varieties, on any good corn-land which is never too wet; and with the culture a good farmer gives his other crops, and the important—nay more, the indispensable requisite to success—*thorough pruning*, no one need fail of attaining a degree of success highly satisfactory and profitable.

“A dwarf pear-tree should never be planted at one year old. (A good one-year-old tree consists of a single upright shoot or stem, from three and one-half to five feet high, and should be cut off at about two feet from the ground; and in order to give a smooth, handsome stem or trunk, let the buds be rubbed off to the height of one foot from the ground—leaving on the upper portion six to nine buds, more or less; with the tree standing in its original position in full vigor, and cut back as above stated, each one of these buds will throw out a good strong branch, which gives a full round distaff-form to the tree; and this is the time and manner, and the only time, when that desirable shape can be given, on which the future form of symmetry and beauty so much depends; and to avoid a fork-topped tree, in which the two uppermost branches are about of equal vigor and height, let the second branch from the top be pinched off, when about nine inches or a foot long, which will check and weaken it, while the uppermost one becomes a strong central leader.) Whereas, if the tree be transplanted at one year old, and cut back as above stated, the vital forces of the tree will be weakened half or three-fourths by transplanting, and, as the result, only two or three (more or less) of the buds on the trunk will grow so as to form branches, and they, perhaps, only at the top or all on one side, while the remaining buds remain dormant, never afterward to be developed, as the other branches form new channels, which will more readily carry the sap to the other and upper portions of the tree.

“For transplanting, therefore, let a tree be two years old

from the bud, well cut back at one year old, and with six to nine main branches, which form the framework or foundation, which is to give form and character to the future tree, with proper care and management.

"The following cut (Fig. 145) will illustrate a two-year-old tree, as above described, its lower branches about one foot from the ground, its upper branches being the strongest and most upright, and those below less vigorous and more horizontal.

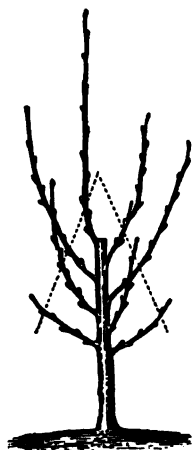


FIG. 145.—Dwarf Pear, marked for trimming and transplanting.

"The dotted lines indicate where the branches should be cut back at the time of planting.

"In cutting a tree, with branches formed as above described, let the leader be cut down within four to six inches of the place where the one-year-old tree was cut off, and just above a good bud on the side of the tree, over the previous year's cut, thus keeping the leader in a perpendicular position over the original trunk or bottom of the tree.

"If the side-branches are too horizontal, upper buds are left for their extension; if too upright, lower buds are left.

Side direction may be given, if desirable, to fill wide spaces, in the same way. Cut the other branches at such a distance from the trunk, that the ends of all of them would form a pyramid, the base of which should not be over twelve to sixteen inches in diameter, and in smallish trees much less; thus the lowest branches will be left the longest; the object of which is to check the natural flow of sap to the upper branches and induce it to flow more forcibly to the lower ones, increasing the vigor and force of the latter as much as possible, which must be done at that time, or never.

"Fig. 146 represents a two-year-old tree after it has been pruned at two years old, and made the third year's growth, and showing where it should be cut back at that time. All subsequent pruning will become easy to any one who has attended to these directions thus far—observing the same

principles, thinning out or cutting back any secondary or other branches, as shall seem necessary to admit light and air, or give vigor or symmetry of form to the tree; but as the greatest force of sap will flow to the central and upright branches, they will need to be cut back most, retaining as near as may be the pyramidal form; ever bearing in mind this fact, that no one prunes too much; and, after having pruned well and gathered rich harvests of luscious pears, if you still

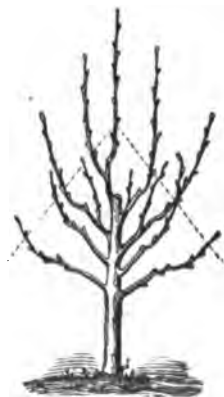


FIG. 146.—Two-Year-Old Tree marked for trimming.

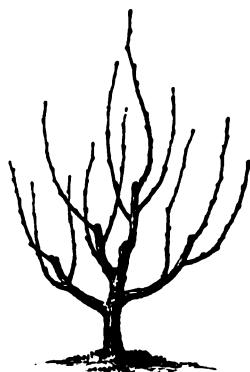


FIG. 147.—Dwarf Apple.

wish to grow them *larger* and *better* than ever before, prune a little closer, and that result will certainly be attained; and the *vigor*, *beauty*, and *longevity* of your trees will be increased thereby."

Throughout the whole process of pruning and training pyramids, as well as every other tree, the frequent error of allowing the shoots and branches to become thick and crowd each other, should be carefully avoided. The size and beauty of the fruit, and its perfection in richness and flavor, where there is plenty of room for the full, vigorous, and healthy development of the LEAVES *which supply the material for the growing fruit*, will repay well the labor required for this excellent result.

Dwarf apples (on Paradise stocks) are usually trained to a round and rather spreading open head, the same principles to

be applied as in forming dwarf pears, with the exception of the form given to them, and being more dwarfish in growth, less shortening of the shoots is required (Fig. 147).

Small, slow-growing varieties, as the Melon, Early Joe, Red Canada, Hawley, Jonathan, Ladies' Sweet, Summer Pearmain, Dyer, Lady Apple, and Lowell, may be pruned into pyramids and kept small, so as to stand not farther than ten feet apart. Thriftier varieties, on Doucain stock, may be treated in the same way.

The Cherry and Plum may be pruned in the form of pyramids on the same principles as the apple and pear. The Morello and Duke cherries, may be treated either as pyramids or as smaller, rounded, open-headed dwarfs.

Pruning Apple-Orchards in Bearing.—The mode of pruning old neglected apple-trees, with a view to restoring their vigor and fruitfulness, is more particularly pointed out on another page; it may be only necessary here to remark that the chief requisites to keep steadily in view during the operation, are:

1. To avoid cutting off large limbs except in cases of absolute necessity.
2. To admit light equally into all parts of the tree by thinning out the branches.
3. To remove all crooked or badly growing limbs, and reserve a handsome evenly distributed top.
4. To do the work gradually, or in successive years, and commencing by preference at the top or centre, which will favor an open top.
5. To give a coating on all fresh wounds an inch or more in diameter, of the composition made of shellac dissolved in alcohol, just thick enough to be of the consistence of paint. The surface should be allowed to remain uncovered a few days after the cut is made, in order to become dry. The handle of the brush being inserted in the cork, it is kept air-tight in drying, and always ready (Fig. 148); but fine sand, brick-dust, or powdered chalk, mixed with warm gas-tar, is a good application and much cheaper. Grafting-wax does well, and may be applied with a brush when melted, or in the form of thick plasters.



FIG. 148.—Bottle of Shellac and Brush.

Pruning-saws are required for this work, which should

always be kept sharp and in good condition; those made with coarse teeth on one edge, and slightly finer on the other, will

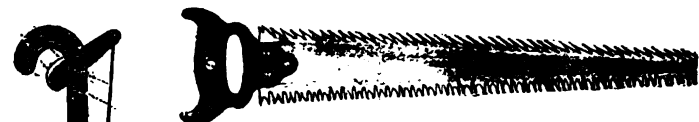


FIG. 149.—Two-edge Pruning Saw.

be found most handy (Fig. 149).

For trimming branches not over one inch in diameter on the more inaccessible parts of the trees, a powerful cutting-shears on the end of a pole has been devised, which is extremely useful (Figs. 150 and 151).

FIG. 150.—Tree-Pruner.

Pruning the Peach.—No tree requires continued pruning so much as the peach. There is a strong tendency in the terminal buds to push upward and outward, at the expense of the side-shoots, which soon dying, the tree ultimately is composed of long, bare poles with only tufts of leaves at their extremities (Fig. 152). It is well known that young trees bear large, handsome, and excellent fruit, while the old, enfeebled trees yield nothing but small specimens of inferior quality. Continued pruning will prevent this bad result, and preserve the heads of old trees in a state of thrifty growth, and they will continue to yield as large and fine fruit as in the first years of bearing. As the peach

FIG. 151.—Walter's Tree-Pruner.

always bears its fruit on the previous years' growth, and buds never start from old wood, it is important to keep a continued supply of young wood, evenly distributed throughout the head. This can only be done

by continued cutting-back. The best way to perform this operation is to commence at the close of winter or early



FIG. 152.—Neglected Peach-tree.

in spring, and cut off the upper half or two-thirds of every one-year shoot. If this process is continued from year to year, in connection with cutting entirely out all the feeble



FIG. 153.—Correctly Trimmed Peach, best method and form.

shoots where they grow too thickly, the desired object will be fully attained, and the trees, as they grow older, instead of presenting the appearance of Fig. 152, will form the sym-

metrical, evenly distributed heads shown in Fig. 153. An important advantage of thus pruning the peach will be the thinning-out of the fruit-buds; and while the tree will bear perhaps only one-third or one-quarter the number of specimens, they will be so much larger as to give as many bushels, while the quality will be incomparably superior.

An objection is made that too much labor is required for this operation. By the use of a good pair of pruning-shears, however, it may be done with great expedition, and half a dozen trees finished in the same time that would be required for a single tree in using the knife.

Another mode, more rapidly performed, and answering

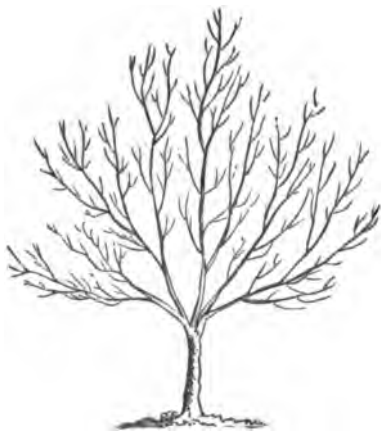


FIG. 154.

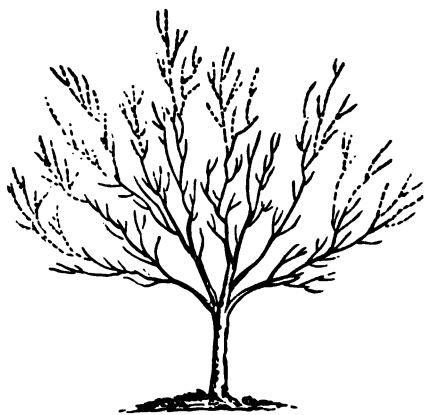


FIG. 155.

nearly the same purpose, is to cut off two or three years' growth at a time, from all the longer branches, taking care to leave a sufficiency of young wood, and always cutting back to a fork, so as not to make a dead stub.

In cases where the pruning has been neglected on young trees, until they have attained several years of age, and the shoots have just begun to die out in the centre, a still more wholesale kind of pruning may be adopted. Three or four feet may be taken off, in cases of necessity, at a single stroke, and if judiciously performed, will convert the broad head which is beginning to become enfeebled, into a smaller, neat,

round, and open head, possessing the thriftiness of a young tree, and bearing as large and excellent fruit. Fig. 154 shows the tree before being thus cut back, and Fig. 155 the same, with all the ends of the branches (shown by dotted lines) removed. It must be remembered here, as in all other instances, that the outer shoots must be sufficiently *thinned back* to admit light to the interior. The shearing, which is sometimes adopted, like that of a common hedge, only thickens the foliage on the outside, and increases instead of diminishing the evil.

Pruning the Cherry.—The cherry usually needs but little pruning, after the young tree has been properly formed. As



FIG. 156.—Untrimmed Quince.



FIG. 157.—Trimmed Quince.

wounds made in winter are apt to form gum, and the removal of much foliage in summer injures the tree by checking its growth, the rubbing and pinching process should be exclusively resorted to, in forming an even and well-distributed head, nearly in the same manner as already described for the apple. The only care, as the trees become older, is to see that no shoots, by outgrowing the others, form a distorted top.

Nearly the same rules apply to the plum; but as single shoots sometimes make a long growth in one season, an eye

must be kept to them, and the necessary rubbing and pinching performed, that they do not outgrow the others.

Pruning the Quince.—Young quince-trees, as sold by nurserymen in this country, have, in many instances, received no pruning or training, and resemble Fig. 156. To give them a single straight stem, and to impart sufficient vigor to form a good well-balanced head, such trees should be cut down near the ground as soon as they become well established, and a single upright shoot allowed to grow for the future tree (Fig. 157). The second year a good head may be commenced, according to the directions given for the dwarf apple.

Special directions for pruning the Grape, Raspberry, Blackberry, Gooseberry, and Currant will be found in the chapters devoted to these different fruits.

Pruning the Roots.—This has been tried to a limited extent only, and has proved useful in checking over-luxuriant growth attended with unfruitfulness. Its tendency, by lessening the supply of sap, is to render trees more dwarfish, and operates not unlike grafting on dwarf stocks; or in the same way, but in less degree, that transplanting produces a like result. It should usually be done early in spring, and with a spade ground sharp and kept solely for this purpose, so that the roots may be cut off smoothly, and not torn or bruised, as with a dull spade. Any required degree of check may be given to the tree by cutting the roots short or near the foot of the stem—a less check by allowing greater length.

Trees which are kept in good shape while young will not require heavy pruning in after years. But orchards rarely receive this perfect management, and more or less pruning



FIG. 156.

occasionally becomes necessary. The owner is often unable to attend in person to all the details, or to direct the laborer in the removal of each successive limb.

To obviate this difficulty, attach a cylinder of chalk to a rod several feet in length, in the manner represented in Fig. 158, and taking this rod in the hand, make a distinct white chalk-mark at the precise spot where the pruning-saw is to cut through for the removal of the rejected branch. The workman follows with the saw, and cuts off every branch at the right place, with greater accuracy than verbal directions could point out, and without hesitation or delay. The owner may mark out enough work with the chalk in an hour to occupy the laborer through the day, and the whole operation be performed with skill and accuracy. If the trees are tall the marking may be done on horseback.

CHAPTER VIII.

IMPLEMENTS USED BY FRUIT CULTIVATORS.

THE more common tools needed are the shovel, the spade, the fork and the hoe, for digging holes, transplanting, and cultivating the ground. The fork and rake are useful in mixing manures with the soil for filling the remote parts of large holes.

The *pruning-knife* (Fig. 159) is a large, usually hooked knife, for removing useless branches.



FIG. 159.—Various Forms of Pruning-Knives.

The *pruning-saw* (Figs. 160 and 161) is needed in taking off larger limbs; attached to a handle several feet long, it will reach those at a distance from the ground.

The *draw-saw* (Fig. 162) has the direction of the teeth the

reverse of the common saw; that is, they should point toward the operator. Being thus only subject to a *pulling* strain, it



FIG. 160.

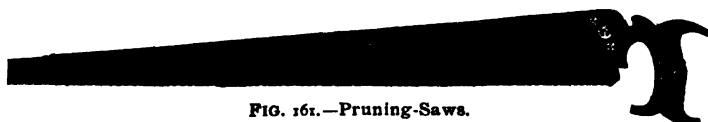


FIG. 161.—Pruning-Saws.

does not require so thick a blade as the *thrust-saw*, with the teeth in the usual way. For this reason it is less liable to



FIG. 162.—Draw-Saw.

become broken or twisted. The two-edged saw (Fig. 163) can be readily purchased anywhere and is very useful.



FIG. 163.—Two-edged Pruning-Saw.

The *budding-knives* (Fig. 164) should have a broad, flat blade, the edge of which is to be rounded outward, for the more ready incision of the bark. The thin ivory blade or *haft* at the extremity of the handle, as provided on some budding-knives, may be dispensed with in nearly all cases, the bud, when set in, lifting the bark as it slides

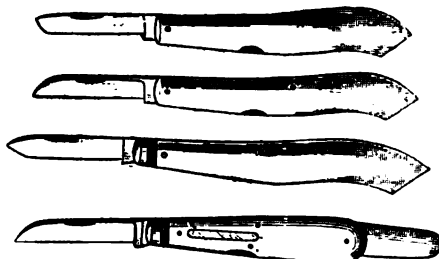


FIG. 164.—Budding-Knives.

downward, more perfectly than by any other mode, after the corners of the bark are lifted with the point of the blade.

The *grafting-chisel* (Fig. 165) is useful in cleft-grafting large apple-trees. It is made of iron, the edge set with steel. It



FIG. 165.—Grafting-Chisel.

is used for splitting the stock, after it is sawed off and pared. The cutting part should be not less than two inches broad, with a sharp edge, which should curve inward, that the bark, in splitting, may be cut first, to give it a smooth, flat face. The

wedge at the end opens the stock to receive the graft.

The pruning shears shown in Figs. 166 and 167 are, taken all in all, the most useful tool the orchardist can have. There



FIG. 166.



FIG. 167.

Forms of Pruning-Shears.

are a variety of patterns of these shears, differing mainly in the form of spring used to keep the blades apart.

In using the long-handled pruning-saw, the pruning-chisel, the graft-cutter, or the fruit-gatherer, the operator may stand

on a ladder or his stool, as an additional assistance in reaching the higher parts of the tree.

The *orchardist's hook* consists of a light rod, with an iron hook at one end, and a piece of wood made to slide along it. In using it the fruit-gatherer draws down the end of a branch with the hook, and fastens it by the sliding-piece to another branch below. The slider passes freely along the rod, but ceases to slide by the friction of the side-strain whenever it is in use, Fig. 168.

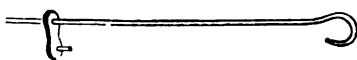


FIG. 168.—Orchardist's Hook.

Fruit on the ends of long and tall branches may be gathered by means of the fruit-picker shown in the annexed figures (Figs. 169 and 170). Fig. 169 consists of a piece of stiff wire about two feet long, bent into the form shown at *a*; the two ends are then thrust through gimlet-holes in the end of a pole; a small bag, large enough to hold half-a-dozen apples, is sewed to the wire. This completes the instrument. The narrow part of the wire assists in removing the stem from the branch. A picker of some sort

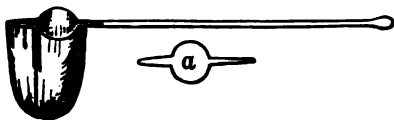


FIG. 169.

Fruit-Picker.



FIG. 170.

is especially valuable in gathering any valuable fruit, such as pears or peaches, which would otherwise be bruised and spoiled.

Vine Scissors.—Neat and convenient instruments for thinning out the berries from bunches of grapes which have grown too thick, for removing unnecessary shoots, leaves, etc., and for gathering the fruit, as shown in the annexed cuts (Figs. 171, 172, and 173).

Garden Reel.—Fig. 174 represents the reel for the garden-line and stake for stretching the same, all made of iron. The stakes should be at least a foot long. The line should be a

strong, well-twisted hemp cord, about one-fifth of an inch in diameter, which, when not in use, is quickly wound up on the reel. It is employed for setting trees in rows.

Self-sustaining fruit-ladders are very useful in gathering fine fruit, to prevent mutilation and

bruising of the bark and branches. Fig. 175 is one of small size and simple construction, is easily carried in one hand, and will raise one's feet a yard or more from the ground. It consists of a small piece of light plank at the top, supported

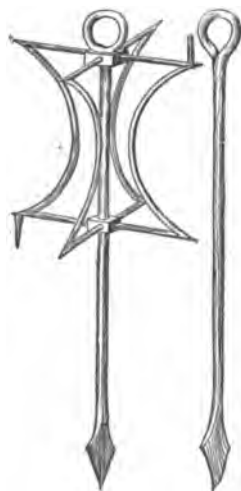


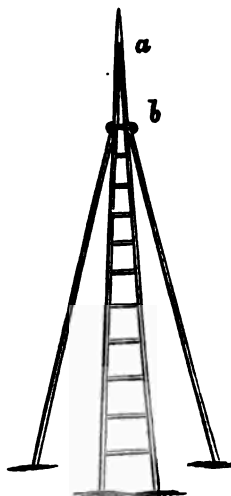
FIG. 174.—Garden Reel.



FIG. 175.



FIG. 176.



Fruit-tree Ladders. FIG. 177.—Pointed Ladder.

on legs not larger than common chair-legs. Fig. 176 represents one from eight to twelve feet high, the two single legs moving on joints, for closing in carrying, and spreading like a tripod in setting up under the tree.

An improvement has been made by continuing the two main bars to a point, which more readily enables the operator to thrust it up among the branches, and often to support himself by grasping this elevated point. The legs turn at the hinges *b* (Fig. 177).

The *folding-ladder* may be closed together with the facility of a pair of compasses; it then becomes a round stick easily

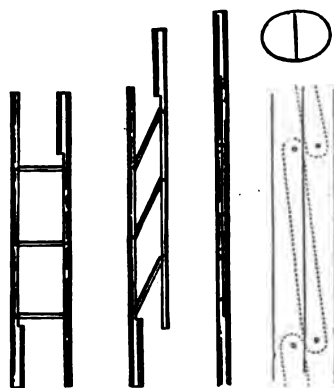


FIG. 178.—Folding Ladder.

carried in one hand. It is made of strong, light wood, and its construction may be readily understood by the annexed figure (Fig. 178), representing the ladder as open, as half-closed, and as closely shut. An enlarged longitudinal section shows the manner in which the rounds lie in the grooves or concave beds in the sides or styles; above which is a cross-section exhibiting the semi-oval form of the styles. The ends of the rounds turn on iron pins, slightly

riveted outside. The rounds resting on shoulders, when the ladder is opened, render the whole stiff and firm. A ladder of this construction is found very useful, not only in fruit-houses, where a common ladder could not be conveniently carried, but in pruning standard trees, because it can be thrust through the branches like a round pole, without difficulty, and when once there, it is easily opened.

Tree Scraper (Fig. 179).—This is used for removing the rough and shaggy bark, moss, etc., from old fruit-trees.

It consists of a triangular plate of steel, attached to a handle at the centre. The sides of the triangle are about four inches, and the handle may be from one to several feet in length.



FIG. 179.—Tree-Scraper.

Garden Syringe (Figs. 180, 181).—This is made of various sizes, or different materials, and with different caps or orifices. The cheapest is made of thick sheet-tin, and the best and

most durable of brass. For throwing a single stream, the jet represented in the figure is attached; for washing dusty foliage with a soft shower, a rose with many fine holes is screwed



FIG. 180.

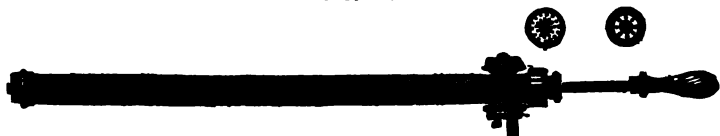


FIG. 181.—Garden Syringe.

on. The syringe is used for washing, watering, destroying insects, etc.

Garden Engine (Fig. 182).—This may be used for all the purposes of a syringe, in washing and watering plants, as well as for washing windows, carriages, and protecting buildings against fire. It will hold about a barrel of water, and is easily moved by its handles on the cast-iron wheels. It will throw water forty feet high.



FIG. 182.—Garden Engine.

Net screens are useful in preventing the attack of birds on rare and valuable fruits upon young or dwarf trees. The net should be dipped in a decoction of tan to prevent mildew when rolled up wet.

Labels for standard trees are useful in retaining the names of the varieties. Purchasers of trees usually neglect the names, and the labels received with the trees being soon lost, nothing more is thought of them till they begin to bear. Curiosity is then excited to know the "new kinds." Conjec-

ture is set on foot, and the greatest confusion follows. Serious and innumerable mistakes are made and perpetuated in this way in all parts of the country.

Permanent labels are therefore important. The simplest is made of a slip of wood, three inches long and half an inch wide, suspended to the branch by a loop of wire; copper wire is the best (Fig. 183). The name will last three or four years, if written with a pencil on a thin coat of fresh white paint. Better and more durable labels are made of small pieces of sheet zinc, written upon with a mixture of two parts (by weight) of verdigris, two of sal-ammoniac, one of lampblack, and thirty of water. The ingredients are to be mixed in a mortar with a small portion of water



FIG. 183.—Tree-tag.

at first, and the whole added afterward. Preserve the mixture in a well-corked bottle, shaking it repeatedly at first, and keep the cork downward to prevent the escape of ammonia, and it will remain fit for use for years. Or just as good, use Payson's or other indelible ink, sold everywhere for marking linen. A common steel pen may be used. Wash the zinc first with vinegar to remove the oiliness which is generally on the metal.

The pieces of zinc may be suspended by copper wire or, better, galvanized-iron wire, as the copper and zinc, when wet, set up a galvanic action which soon cuts the label loose; it should be firmly twisted round the zinc, so as not to remain loose (Fig. 184), or else the constant motion from wind will soon wear out the wire. The wire should be nearly as large as a small knitting-needle, to prevent cracking off by long use. The loop should be large, and pass round a side-shoot instead of a main branch, to prevent the danger of cutting-in by the growth of the tree; and should be attached below a small fork, to prevent its blowing off the end of the branch.

The wire may be wholly dispensed with by the following contrivance: cut the zinc into long triangular strips, half an inch wide and from six to ten inches long. Draw the narrow



FIG. 184.—Zinc Tag.

or slender end round the twig, bring it through a hole punched midway between the ends, and clinch or twist it with the fingers or a small pair of pincers (Fig. 185). These labels may be cut and punched by a tinman at a cheap rate.

A good, durable, and cheap label is made of sheet tin. Cut the tin in strips about six inches long, somewhat in the form of a wedge, about a fourth of an inch wide at one end and three-fourths at the other. Write the name

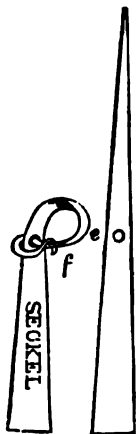


FIG. 185.—Zinc Tag.

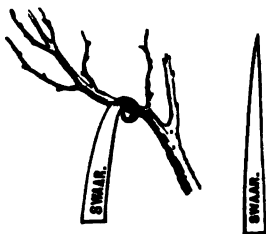


FIG. 186.—Zinc Tag.

near the wide end, with any sharp steel instrument, as an awl, or end of a file ground sharp, bearing on hard enough to go through the tin coating, so as to reach the iron. In a few months the rain, by penetrating to the iron, will rust it, and make the name quite conspicuous. The label is then attached to the tree by bending the narrow end once about a side-limb (Fig. 186). As the tree grows this coil will expand, and not cut the bark. On this account thin tin plate is better than thick. The coil should pass around but once, or it will not give way freely to the increase of growth.

Any tin-worker will cut them of scrap or refuse plate for about ten or fifteen cents per hundred.

Lead labels, in the form of those represented in Fig. 182, stamped with type, and suspended with copper wire, well twisted against the hole, to prevent wearing by the motion of the wind, are very durable. Fig. 187 shows the mode of stamping, by sliding the sheet-lead between two plates of iron, A, B, screwed together, and setting the types successively against the upper plate, A, and stamping one at a time. The

letters are thus kept in a straight line. The imprinted end of the sheet-lead is then cut off, and forms the label.

Composition lead labels with the names cast on them are much used in England, are very neat and durable but expensive. (Fig. 188). They may be imported from any of the leading seedsmen abroad.

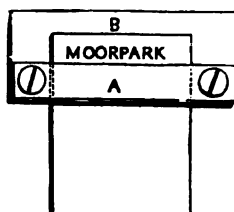
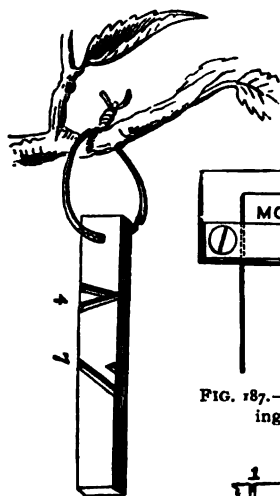


FIG. 187.—Device for Stamping Lead Tags.

FIG. 188.—English Cast Metal Tag.

FIG. 190.—Notched Number Wooden Tag.

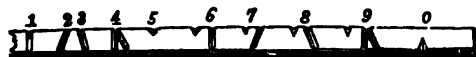


FIG. 189.—Numbering by a Notched Stick.

Sticks or tallies at the ends of nursery rows, or labels suspended on the successive trees of a row of standards, may be durably numbered on red cedar, after the following manner, to correspond with a written register in a book. Fig. 189 shows the mode of notching with a knife, to indicate the ten figures. To prevent mistakes by getting them inverted, they are always read downward on a stake, or from the loop of a suspended label. Fig. 190 exhibits a label on a tree marked with the number 47.

No person who plants an orchard or fruit-garden should depend for distinguishing the names of his trees wholly on labels, which may be lost off. The rows, and the kinds in each row, should be registered in successive order, in a book kept for the purpose. This will facilitate the replacement of any lost label.

CHAPTER IX.

THINNING, GATHERING, KEEPING, AND MARKETING.

THINNING.

NEXT to good cultivation, nothing contributes more to bring out the excellent qualities of fruit, and to give it size and a handsome appearance, than thinning the young fruit on the tree. If crowded, it is small and often comparatively flavorless. Overbearing always injures the growth of the tree, yet thinning the fruit is scarcely ever practised. The farmer who takes care not to have more than four stalks of corn in a hill, and who would consider it folly to have twenty, never thins any of the twenty peaches on a small shoot. The gardener who would allow twenty cucumber vines in a hill, would be called an ignoramus by his neighbor, who at the same time suffers a dwarf pear to bear five times as many specimens as it could profitably mature.

E. Moody, of Lockport, a successful fruit-marketer, stated before the Fruit-Growers' Society at Rochester, that he had found great profit in thinning the fruit on his peach-trees; that while he had much fewer specimens in consequence of thinning, he had about as many bushels; the larger peaches could be picked in far less time, and while his fine crop sold readily at a dollar and a half per basket, his neighbor, who did not practise thinning, found it difficult to sell his for thirty-seven or fifty cents.

President Wilder said, in an address before the American Pomological Society: "One of the best cultivators in the vicinity of Boston has reduced this theory to practice, with the happiest effect, in the cultivation of the pear. He produces every year superior fruit, which commands the highest price. Some have doubted whether this practice can be made

remunerative, except in its application to the finer fruits. But another cultivator, who raises an annual crop of the best apples, assures us that the secret of his success is the thinning of the fruit, and he has no doubt of the economy of the practice."

Apples and pears, when half grown, will show any defects or injuries from insects. In thinning the fruit these defective specimens should, in all cases, be removed. As many bushels of good fruit will be obtained from the trees in autumn as there would have been of good and bad mixed together, had all been left to grow. The labor of assorting will be lessened, and the fruit bring a higher price in market. An experienced orchardist says that one day's work to fifty barrels of apples will thus take out nearly all the imperfect fruit; while the increased labor of hand-picking so many poor specimens will be as great as taking them off in summer, when less care will be required with them.

GATHERING.

Mankind consists of two grand divisions—the careless and careful. Each individual may be assigned his place under these two great heads by observing how he picks or gathers fruit. The careless shake the crop down on the ground, or, if picked by hand, *throw* the specimens into the basket, rather than carry and deposit them carefully. Such persons wonder why they have such poor luck in keeping fruit—it nearly all rots prematurely.

The following is the right way: Gather by means of hooked baskets suspended in the tree; the apples, as gathered, should be laid one at a time in the bottom of the basket, and when filled the man comes down and places two at a time in the two-bushel basket. To prevent the possibility of bruising, these should be drawn to the fruit-house on a spring wagon, and two apples only should be taken out at a time, till all are carefully deposited on the floor. After being barrelled, they can be stored till wanted or carried to the cars or steamboat, and carried, not rolled, on board. If they are shipped to England, one barrel must be hoisted at a time and caught on a man's shoulder at the ship, and carried by two men and

deposited in place. When again unloaded the same care is observed, the barrels being carried off on a hand-barrow. Throughout the whole process the same care is observed as in carrying a looking-glass.

Various modes are adopted for hand-picking apples and other fruit. Ladders should always be provided for reaching the different parts of the tree. Step-ladders, five or six feet high, may be used for the lower limbs; longer ladders, resting against the branches, or supported by legs as shown in the chapter on Implements, are employed for higher portions. The remaining scattered fruit may be collected with a fruit-gatherer attached to the end of a pole. These are all figured and described in the chapter on Implements. Baskets are commonly employed furnished with hooks for suspending to the limbs or rounds of the ladder while filling. In picking, apples should be lifted up to break off the stem, instead of pulling them off, as many of the stems will pull out of the apples, causing decay. They should be laid in the basket (instead of being pitched or dropped in) to avoid bruising. A better way is to buckle a strap passing over the shoulder and beneath the arm, to which the basket may be hooked, leaving both hands free for work. These baskets should be round, so as to be small enough to allow turning for emptying while in the barrel, that the fruit may fall as short a distance as possible. Another mode is to wear a coat, made for the purpose, of strong canvas, furnished with large pockets on both sides, holding a peck or more each. The coat is slipped off and the pockets emptied into large baskets or barrels. A better and more expeditious method is to take a common clean grain-bag and place a stick, sharpened at each end and about a foot long, so as to prop the mouth open, leaving a triangular opening, ready for the reception of apples as fast as picked by both hands. Tie the upper and lower corner together, by placing a pebble in the lower corner, so as to form a knob or button, and then tie the bag-strings closely above it. It is then slung over the shoulder, as shown in Fig. 183. A piece of stiff leather buttoned on the shoulder serves to protect it from the weight of the bag. When the bag is filled it is placed in the bottom of the barrel or basket, and emptied by carefully withdrawing the bag and allowing the

apples to slide out without danger of bruising. In this respect it is more perfect than a basket, the contents of which must be dropped, unless handed out one by one.

The degree of maturity at which fruit should be picked varies with circumstances. Maturity is indicated in apples or

pears by the dark-brown color of the seeds, but as these cannot be examined, external appearances must serve as a guide. Early apples are best when they have attained full color, and have begun to soften, except such as are liable to become dry or mealy, which should be picked some days before fully ripe. Winter apples should be mature but not ripe. All late winter varieties should be gathered when too hard to yield to the pressure of the thumb, and always before heavy autumn frosts. When a good keeper begins to drop from the tree, as sometimes happens, the crop should be gathered immediately. Windfalls should never be mixed with hand-picked

fruit, as they have been bruised by falling, and often heated by the sun's rays so as to diminish their keeping qualities. They should be assorted and reserved for immediate use. Maturity in pears is indicated by a slight change in the color of the skin, and by the readiness with which the stem separates from the tree when the pear is lifted by the hand. There are, however, exceptions to this rule—the Bartlett, for instance, may be picked even before it has attained full size, and, in a week or two, will ripen into a fine, melting texture and excellent flavor. Ripening summer pears in the dark much improves their appearance. A Bartlett, for instance, fully exposed to the sun and allowed to ripen on the tree, or in a well-lighted apartment, will show perhaps only a light-brown cheek; but, if in a dark drawer, the light-brown will become a beautiful



FIG. 191.—The Proper Way to Pick Apples.

carmine or crimson. When drawers are not at hand the maturing process may be accomplished on shelves, by first spreading a thick piece of woollen cloth, laying the pears on this, and covering them with the same.

Nearly all pears ripen with a much finer flavor if picked and afterward matured in the house. The exceptions are very few. Some, which prove only second or third rate when allowed to remain till they soften on the tree, become rich, melting, and delicious if house-ripened. Gathering the fruit while yet hard will, in nearly all cases, prevent or greatly diminish the *rotting at the core*, which otherwise nearly destroys the value of many early sorts.

Most varieties of winter pears should hang as long on the trees as safety from frost will permit, in order that their fine qualities may be fully perfected. Nothing contributes more to this high quality than keeping the trees in a state of strong, healthy growth, by good cultivation, in connection with thinning the fruit on the branches. There are a few sorts, as the Lawrence and Winter Nelis, which always, like the Seckel in autumn, possess a good flavor when even of small size; but most pears are greatly improved in quality, and all in fine appearance, when grown to a full size.

ASSORTING AND PACKING FOR MARKET.

Assorting, or separating the large from the small, the smooth from the defective, and the hard from the partly ripened, is a practice of great importance, though often neglected. Skilful marketers have learned that apples or pears of two sizes will both bring higher prices when separated, than when left mixed together. Indeed, a few small apples in a barrel have sometimes prevented the sale of the whole. This holds true of all kinds of fruit. For the same reason the most successful strawberry-growers are careful to assort the whole crop before placing the fruit in the boxes.

For long keeping, apples and pears should be carefully assorted, according to the degree of maturity which they show. Ripe ones soonest decay, and if mixed with hard ones soon spoil the whole. If separated, the frequent picking over is avoided.

Where apples are sold by the quantity, barrels are always best for packing, as well for cheapness and strength as for the ease with which they may be moved without jolting. Apples will keep best if exposed in heaps two or three weeks to open air before barrelling—as some of the exterior moisture escapes, and they become less liable to decay. The few minutes' additional time required to deposit them carefully and without dropping into the barrels, will be many times repaid by the fine condition in which the consumer finds them. There should always be at least two barrels placed side by side when filling; one should be marked "extra," and as the assorting proceeds should receive none but the finest specimens; the other only such as are decidedly good; all the rest, including those that are bruised, scabby, or marked with insects, should be rejected for distant market, and used only for home purposes, such as stewing, converting into cider, or feeding to domestic animals. In well-managed orchards, where pruning or thinning the branches, thinning the fruit, and proper cultivation have been attended to, this third or inferior portion will constitute but a very small part; in other orchards, grown up with suckers, weeds, and grass, and with tops consisting of brush and stunted branches, the labor of selection will be small, for the whole crop will be of this third portion.

Apples should be so snugly placed in the barrels that there can be no rattling when they are moved. They should therefore be slightly shaken several times while filling. A little practice will enable any one to do this sufficiently without danger of bruising. The upper stratum should be made as straight and uniform as practicable, and at such a height that the head of the barrel will slightly indent them—the dry wood absorbing the moisture and preventing decay.

A simple contrivance is adopted by packers for placing the head in position, and is shown in the annexed sketch (Fig. 192). It consists of a plank, *a*, on which the barrel stands, into one end of which is dovetailed an upright piece of plank, *b*, a little higher than the top of the barrel. A slot, *c*, is cut in its upper end, and a pin runs across to receive the end of the lever, *d*, which may be six or eight feet long. A round board is used as a follower, to be placed upon the head; and across this board is placed a cylindrical piece of wood about

three inches in diameter (and flat on the lower side), on which the lever is placed. A moderate pressure at the end of the lever, and a little practice in its use, will enable the operator to bring the head to its position with great ease, precision, and accuracy.

Fig. 193 shows another simple form of press, which requires an iron yoke made as shown, and Fig. 194, a still more perfect press.

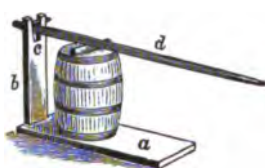


FIG. 192.—Simple Contrivance for heading-up Apple-Barrels.

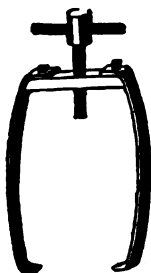


FIG. 193.—Cheap Press for heading-up Apple-Barrels.

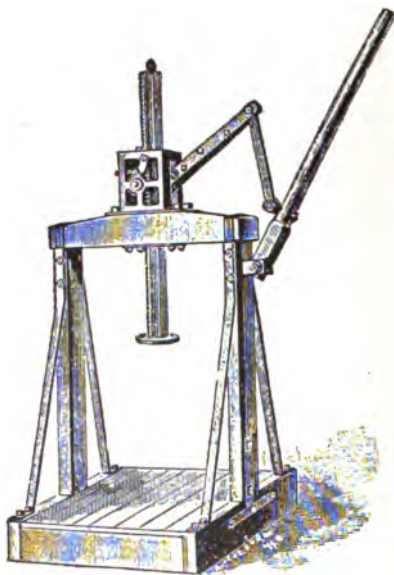


FIG. 194.—Press for heading-up Apple-Barrels.

Before filling, the barrel should have the hoops firmly driven on the bottom and nailed with shingle-nails, then drive on the bulge hoops and secure them with three or four barrel-nails in the outside ones. When filled, nail the head firmly. It is a good precaution to nail a small hoop outside each head and within the staves to prevent the bursting-out of the heads, which otherwise sometimes happens through careless handling.

Half-barrels have been found convenient for packing and

keeping winter pears, and for sending them to market, packed as described for apples. Pear-growers who send their crops to distant markets should pack them early enough to reach their destination before the softening process has commenced. Large losses have sometimes occurred from bruising and other injury when summer or autumn pears have been sent too late.

Apples and pears for shipping have sometimes been packed in charcoal dust, dry sand—and at other times separately wrapped in paper, in the same manner as oranges are shipped—but they can be shipped with as much success without anything with them, if only managed with care in other respects.

In shipping fruit, none but the very best should be sent; all that are small, imperfect, or the least bruised, should be rejected.

Packing Grapes for Market.—None but well-grown and well-ripened bunches should be taken for this purpose. They should be picked on a dry day, and all imperfect berries removed from the bunch. They should be allowed to dry a few days, which lessens their liability to be broken. Grapes are now generally sent to market packed in small wooden baskets containing five and ten pounds each and upward—a wooden cover fitting over the top and holding the fruit firmly in place. For immediate consumption some of the finest fruit is packed in wooden baskets without handles and sent to market in crates holding from four to eight baskets.

Such varieties of the grape as have a tough skin are least injured by long journeys; while those like the Concord, which are tender, cannot be sent to a distant market without many of the berries being broken open, although this liability is somewhat lessened by drying and slightly wilting for a week or two before packing.

The most successful grape-raisers, after they have selected the best sorts and the best soil, still give assiduous attention to three great points, viz. : 1. Good and constant cultivation; 2. Careful and judicious pruning and thinning-out defective fruit; 3. Careful gathering and the most careful packing. E. M. Bradley, of East Bloomfield, N. Y., a skilful marketer, has kindly furnished the author of this work the following statement of his management:

"Permit me first to say, that the market value of the grape is more dependent upon judicious handling than that of any other fruit with which I am conversant. While the grape is a fruit peculiarly constituted to endure almost an unlimited amount of abuse in handling, no other fruit so richly pays every iota of care that may be expended upon it. The most casual observer of our great fruit-markets cannot but have noticed the wide range of prices in all kinds of fruit, produced by a difference in method and style of handling. And no fruit with which I am acquainted suffers more from neglect in growing and marketing, or more amply repays thorough husbandry.

"Thorough pulverization of the soil to a liberal depth *every week* during the *growing season* of the vine, a systematic thinning of fruit, and removing of all superfluous growth, will secure a well-matured crop of grapes. As soon as fully ripe (not before), the fruit should be carefully picked and laid in shallow, well-ventilated drawers, carried to the packing-house on a spring-wagon, and placed in racks or cribs over registers so constructed as to afford plenty of fresh air, but not exposed to light, or artificial heat. Here the fruit may remain for months in safety, and retain its plumpness and bloom perfectly. When desirable to send to market, the drawers are taken from the rack in the storeroom, and placed upon the tables in the packing-rooms, where the fruit is carefully assorted, all green berries and superfluous stems removed, and packed closely in paper pockets or wooden boxes, and immediately shipped. The packing-rooms should be well lighted. Small paper pockets, containing from one to three pounds, snugly packed in wooden cases, two dozen pockets in a case, are found to carry the fruit more safely to market than larger packages. The cases should be as nearly air-tight as possible. I have sent many tons, packed in this manner, to Charleston, S. C., Nashville, Tenn., Quincy, Bloomington, and Dubuque, on the Mississippi River, and many other towns, over equally hazardous routes, with entire safety. Good grapes, neatly packed in fancy paper pockets, will always sell at remunerative prices, however much the market may be '*glutted*' with fruit put up in a slovenly manner.

"In answer to your inquiries as to size and shape of

'pockets' most desirable, I would suggest as a rule, that the package be made to suit the desired market.

"Fancy-fruit retailers, who aim at high prices, require a fancy package, and in the early part of the season a one-pound package, gotten up in best style, will command as much money as a four or six pound package of equally good fruit, but less pretentious pockets; whilst the hotel or 'corner-grocery' men prefer them (for the table, or to be weighed out by the pound) in wooden cases, containing from twenty-five to thirty pounds each.

"My aim has ever been, in putting grapes into market, to meet the wants of the trade that I endeavored to supply. Boston, for example, will realize an enormous price for first-class fruit in fancy packages, whilst New York would pay far better in wood than in the costly pockets consumed by Boston every-day trade.

"Our one-pound pockets are the usual depth (three and a half inches), and about four inches in width, round, and covered with the very best embossed and gilt-figured paper, lined inside with white, and mounted on top with copper tippings and a fancy label printed in colors.

"The two-pound boxes (of which I used about 20,000 the past season) are of the same depth, made of the same material, and in the same style as the one-pound box. The body and top of the box is pasteboard, with wooden bottom, about one-quarter inch in thickness, tacked and glued in. The square, flat box is out of date, and unsalable in all our principal markets.

"Our paper pockets are packed in good, tight pine cases, two dozen in a case, and make a very safe package for transporting to any desired distance. The wooden cases are furnished with rope handles for convenience of handling, and to prevent baggage-men from turning over or placing on end.

"A tight pocket and a tight case are desirable for transmitting grapes to any distance or to any clime. I commenced shipping to Charleston, S. C., in 1857, in perforated pockets and open crates, thinking they would stand the sea-voyage and hot weather better than in close packages, but soon discovered my mistake, and have ever since shipped in close pockets and cases."

Packing Strawberries and Other Small Fruits.—These should be packed in small or shallow boxes, holding not over one quart—and sent to market in open-slat wooden crates. Both baskets and crates, such as are now almost universally used everywhere, are undoubtedly familiar to every one

A convenient, light, and cheap set of drawers, or flat boxes, for conveying such firm-fleshed berries as currants, gooseberries, and the more solid strawberries, or for holding the smaller boxes, much used in portions of the West, is constructed in the following manner:

1. Prepare five drawers, each two feet long and twenty inches wide, and two inches deep in the clear. It is best to have them made of pine, three-eighths of an inch thick. It is most convenient to have the stuff all sawed the same width, say two and



FIG. 195.

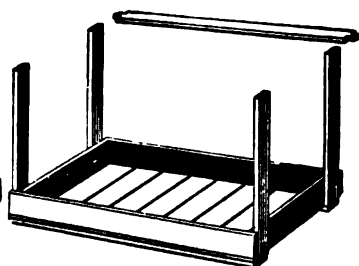


FIG. 197.

FIG. 196.

Wooden Nests for Small Fruit.

a half inches wide, and use it this width for the bottom, leaving them about one-sixteenth of an inch apart for ventilation. The front and back sides of each drawer should extend three-quarters of an inch beyond the ends, as shown in Fig. 195. Next, provide two strips of strong wood (white ash for example) two inches wide and three-quarters of an inch thick. These should be of the same length as the sides of the box, so that when placed lengthwise under the box they may project three-quarters of an inch beyond the ends. Nail these strips so that they shall be lengthwise under the bottom, and three-eighths of an inch from the outer part of the sides. The nails may be driven through the bottom down into the strips. Then nail to the box four similar strips placed vertically, so that their ends shall rest on these projecting pieces, as shown in Fig. 196, and strengthen the connection by sheet-iron straps passing around the corners.

When the boxes are used, the lower one, Fig. 196, is filled with berries; then the next one, Fig. 195, is placed upon it, the projections exactly fitting the posts. This is next filled, and so on, successively, till the five drawers are all filled and in their places within the posts. Cut a board for a lid so as to fit accurately inside of these upright posts, which should be just long enough to project slightly above the lid. There should be open mortices or slots in the top of each post, so as to admit two top pieces, Fig. 197, made the same size as the bottom pieces already described, and with tenons cut on the ends to fit the slots. When these pieces are put in their places and fastened there by means of iron pins through them, or by means of hinged iron straps running over them and keying closely down, the lid will then be held securely to its place, and the whole set of drawers, with its contents, will be ready for railway conveyance. Additional strips extending across the ends from post to post (which may be nailed outside of them) serve as handles and strengthen the whole.

It will be observed that the case, consisting almost entirely of drawers, is light. The arrangement of strips around the drawers, securely fastened at the corners, makes the case strong. Berries can be put into these drawers in bulk, or any of the boxes in use can be placed in them. They are cheap—a good carpenter can make four in a day, complete; the whole cost, made in the best manner, will not exceed \$1.50 or \$2.00 for a case holding two and a half or three bushels.

Keeping Fruit.—The essential requisites for the successful keeping of fruit are—1. A proper degree of maturity; 2. Careful hand-picking to avoid all bruises; 3. Assorting the ripe from the unripe; 4. An apartment with a low temperature and free from superabundant moisture; and 5. A pure air, free from unpleasant odors.

If a house-cellar is employed for this purpose, the fruit-room should be entirely separated from the rest by means of a wall for the purpose of excluding all odors, and for more perfectly controlling the temperature. On this account a cellar under a grain-barn commonly succeeds best, the floor above being double with a space of air between. A cellar that is too moist may be rendered dryer by paving with small

or broken stone, and covering this pavement with a coating of water-lime cement; and by building a single-brick wall within the common cellar walls, with an interposed space of air. Windows, hung on hinges on opposite sides, and rolling blinds, will assist in maintaining proper ventilation and temperature. A thermometer should be constantly kept in the apartment, which should be at all times near the freezing point if practicable. If the cellar cannot be kept cool enough in autumn, the fruit may be left till cold weather in open barrels, in a dry barn or shed opening to the north.

With a few exceptions, winter pears, if well matured, will keep and ripen in such an apartment without difficulty. There are a few sorts, however, which will require some days in a warmer room to finish the ripening process.

Apples may be kept headed in barrels resting on their sides if needed for spring use. If bedded in baked sawdust, or soft chaff (the chaff of timothy is best), moisture will be absorbed, the temperature kept cool and even, and few will decay. Those required for consumption through winter are kept best upon shelves. The shelves should be in the middle, and a passage extend all around, both for ready access and for ventilation. The shelves may be five feet wide, which will enable the attendant to reach the middle from either side without difficulty. There may be three shelves in an apartment nine feet high, with a space of two and a half feet between each, the lower one being within a foot of the floor. A board five inches high should extend around the edge of each shelf. For keeping pears, these shelves should be furnished with lids or covers to exclude the light; or flat movable boxes with covers may be placed on the shelves for the same purpose. A better and more compact contrivance for keeping pears is a series of drawers, occupying one or both sides of an apartment. Unless the fruit-cellar is a very dry one, these drawers should be in an unfreezing room above. The size of the fruit-cellar may vary with the amount to be kept. If the shelves are five feet wide, and a passage two and a half feet wide extend around them, a width of ten feet would be required for the whole apartment. The room may be of any desired length. A double series of shelves would require a width of seventeen and a half feet.

The accompanying figure (Fig. 198) represents the plan of a simple fruit-room, with shelves five feet wide in the centre, three in number, one above the other, supported by six posts,

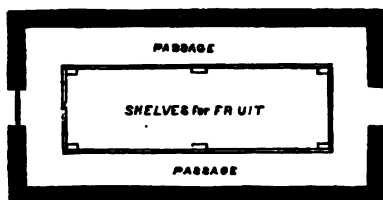


FIG. 198.—Plan of Fruit Room.

with a passage two and a half or three feet wide all around. Fig. 199 represents a larger fruit-room, with two series of shelves, and a row of drawers for pears on each side.

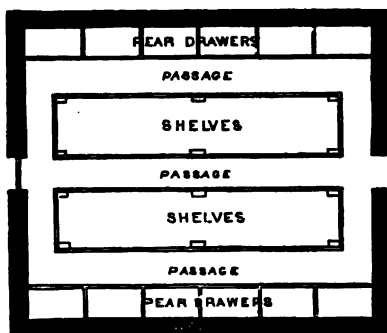


FIG. 199.—Plan for Larger Fruit Room.

Fruit-houses kept cold by ice are usually too expensive in construction and too costly in management for general use, and they are chiefly applicable to the perishable fruit ripening in summer and autumn. Winter fruit may be sufficiently preserved in what are termed "cold-air" houses until the ripening of early strawberries and other small fruits, after which there is little demand for the supplies of the preceding year.

The *cold-air* houses are separate buildings above ground, built in the following manner: The walls are double, with a space filled with sawdust a foot thick, and they may be all

wood, or brick and stone, or have a triple-brick wall, the middle one with the brick on edge, and all bound together. The lower and upper floors are double, with the spaces filled with sawdust. The stone underpinning gives two feet air-space beneath the lower floor. The fruit-room is cooled by admitting the air from the outside through openings in the underpinning and through the lower floor, the warm air above passing out by a ventilator through the attic, which is surmounted with a cap which will insure an upward current of air when there is any wind or breeze. A single double-window affords sufficient light, and the fruit-room is entered through double doors set in an entry. As soon as the fruit-room is filled in autumn, it is cooled by the admission of cold night-air, and is kept within two or three degrees of freezing. To effect this cooling, the plank registers are opened in the ventilator above and in the lower floor, and air is admitted through the openings in the underpinning from without. When the thermometer shows the temperature of the room to be near freezing, the openings in the underpinning are shut with close-fitting wooden blocks, and the plank registers in the lower floor and in the ventilator are closed. By replenishing the cold air from without when required, the temperature is kept within two or three degrees of freezing through winter and spring as long as cool nights continue.

Large, two-story houses may be built for holding several thousand bushels, the second floor being made of slats to admit the air from below. The low temperature is more completely preserved by closing and packing the windows and doors as soon as the house is filled with fruit, and entering at the top, by means of outside stairs and a passage through the attic. These stairs are enclosed from the weather. A thermometer set in a niche in the lower end of a sliding-rod passing through the upper floor, enables the attendant to ascertain the temperature without entering and disturbing the air in the fruit-room below.

The air of the room may be partly cooled during the warm weather of summer by opening the ventilator and registers and admitting the earth-cooled air from the space beneath the lower floor. If large quantities of fruit are to be stored, the floors must be well strengthened with posts and piers. The

air in well-constructed houses on the cold-air principle has been kept for five months, through winter, within three degrees of freezing.

One of the most convenient modes for gathering, storing, and keeping apples for home consumption, is in flat boxes. These are filled directly from the trees in the orchard, and they may be at once conveyed to an out-building, or piled



FIG. 200.—Piling Fruit Boxes.

up in a sheltered place in the orchard in the way shown in Fig. 200. This mode admits the free circulation of air, and they may be protected from the weather with a board cover. As winter approaches, they are conveyed to the cellar or fruit-room without disturbing their contents. Or if they are to be received in a cold fruit-house, the fresh fruit may be at once conveyed to it.

When packed away for winter, the boxes may be disposed of as shown in Fig. 201, and when they are examined for the



FIG. 201.—Storing Fruit Boxes.

removal of decaying specimens, the boxes are taken down one at a time, and replaced in a new pile. It will obviate the necessity of disturbing or turning over the fruit for examination, if the

boxes are quite shallow or only three or four inches deep, so as to contain only a single layer of specimens. They should have slatted bottoms, to admit the circulation of the cool air. If the lumber of which they are made is sawed of the right width, they are rapidly constructed by nailing together. A convenient size for the boxes is twenty by twenty-four inches, with slats at the bottom two inches wide and three-fourths of an inch apart. They will be cheaper for the same contents if six inches deep; but the fruit is more easily picked over when in a single layer with a depth of only three inches.

If the boxes are well made they will fit closely together in the piles, and, if desired, give nearly the same advantages of protection from currents of air and changes of temperature as when packed in barrels, while the fruit may be examined at

any time for the removal of decaying specimens, without being disturbed from the moment it is placed in the boxes in the orchard until taken out for use. This mode admits the storing of a large amount of fruit within a small space.

Keeping Grapes.—The great leading requisite for keeping grapes successfully in winter is to have them *well ripened*, but not over-ripe. When grown on crowded, unpruned, uncultivated vines, they will be small, acid, and watery, and will quickly shrivel in a dry atmosphere, and mould and decay in a moist one; and they will soon freeze if the temperature of the air goes much below the freezing point. But well-grown and well-ripened fruit (resulting from good cultivation and judicious pruning) contains a rich juice, which prevents them from shrivelling or decaying, and freezing, even at low temperature. Various modes are recommended for packing away grapes for winter. They all succeed well, if good, well-ripened fruit is taken, as already mentioned, and they are placed in a cool and rather dry apartment where they will not freeze. If packed in boxes, they are less liable to freeze than when exposed. These boxes should not be of pine, as it imparts a resinous flavor. They should, of course, be entirely free from moisture when packed away. As a general rule they are not ripe enough unless the stem which holds them has lost its naturally green color and has assumed something of the color of the grapes—which will be somewhat purple in all dark-colored varieties.

"Pick when fully ripe, and on a pleasant day. Let them stand in the grape-house for ten days or two weeks until all moisture is gone, and the stems are perfectly dry. Then pack in a small and shallow box about fourteen by ten and four inches deep, after cutting out all imperfect berries. Pack close and tight, and in the manner that the Hammondsport or Ohio grapes are sent to market, and nail up the boxes. Use no paper whatever. I have Isabellas to-day (March 7th) in fine order, packed this way. They must be kept in a cool and dry place."

H. G. Warner, of Rochester, who has kept grapes nearly into midsummer, lays down four essential requisites. They must be *ripe, clean, dry, and cold*. They are packed in boxes containing five, twelve, and twenty-four pounds. They are

placed in a cellar under his barn, where the temperature is often twenty-eight degrees through winter. Grapes will not freeze at this temperature when kept in boxes. He is careful not to place so many in each as to press upon or crush the lower ones. The boxes are nailed up and set one upon another, so as to occupy little room.

In conclusion, the following rules may be presented for strict observance in keeping fruit:

1. Let the temperature be kept as near the freezing point as practicable.
2. Keep the temperature as uniform as possible, as an occasional warm draught hastens decay.
3. Exclude air-currents of any kind not required to maintain a uniform degree of cold; hence drawers or covered boxes are better than open shelves.
4. Keep all odors away from the fruit, especially such odors as come from badly kept cellars.

CHAPTER X.

FRUITS TO SUPPLY A FAMILY.

THE question is often asked, "What shall I plant in order to obtain a full supply of fresh fruit for a family the year round?" It is difficult to give a precise list, as in some seasons the crop may be many times greater than in others; and again, some will bear abundantly and others fail in the same season. The following, however, will serve as an approximation:

The earliest fruits, about the first of summer, will be strawberries. A selection of the most productive sorts, well cultivated, with the runners kept cut off, will afford about one quart a day from each square rod for a month. Three or four square rods will, therefore, give an abundant supply for a family. Four or five hundred plants will be sufficient for this extent of ground. These will be followed by the earliest cherries, and by currants, raspberries, and gooseberries. Fifty bushes of each of the two best sorts of currants, one hundred each of two varieties of raspberries, and twenty-five bushes of Industry or other good gooseberry, will, if well cultivated, furnish an abundant supply. There are some other gooseberries now as good or better. One dozen cherry-trees will be enough. One hundred bushes of the blackberry will supply two quarts a day for some weeks toward the close of summer. Apricots, early apples, and early pears, and a few of the earliest plums, will commence the season of abundance which, with the later varieties of these fruits, will last till near winter. Winter apples and pears, and all the good-keeping varieties of the grape, will continue the supply until spring. Long-keeping apples, such as the Northern Spy, Roxbury Russet, and other sorts, if placed in a good, cool fruit-room or cellar, will continue often until the commencement of the new supply of strawberries.

To obtain this supply there may be five or six apricot-trees, ten or twenty of plums, ten or fifteen of summer and autumn

pears, and as many more of winter varieties, the same number of summer and autumn apples, and from twenty-five to fifty trees of winter apples. Forty or fifty peach-trees and the same number of well-managed grape-vines will contribute materially to the variety and excellence of the supply. One hundred grape-vines in a well-cultivated vineyard will be sufficient to furnish all the fresh grapes wanted by a large family through the autumn and early winter months.

The extent of ground required will be about ten or twelve square rods for the different summer fruits, and an acre and a half or two acres more for all the others except the winter apples.

PLAN OF A FRUIT GARDEN.

The accompanying plan (Fig. 202) of an *acre fruit garden* shows the number and disposition of the trees of each kind. It is represented as a *square*, but may be varied in form to an oblong shape, planting about the same number of trees in fewer or more rows, as the case may be. It is so arranged that although the trees are of different sizes and at different distances, the rows run both ways, and admit readily of horse-cultivation. The plums are placed in a row at one side, in order that pigs and poultry may be confined exclusively among them during the season of the curculio, which proves one of the most efficient means for its destruction; and in connection with knocking on sheets, will afford good crops under any circumstances, if fully and efficiently applied. A movable or hurdle-fence, separating the plums from the rest of the trees, renders the remedy many times more efficient than if these animals were allowed the whole range of the fruit garden. In some places, where the curculio is particularly destructive, cherries and early apples are also attacked; in which case, as these fruits are next to the plum row, all may be included in the pig-yard, if desired.

Autumn and winter apples are not required in an enclosure of this kind, and the early sorts are placed here only to protect them from being stolen, besides the reason last named.

Pears may be planted with standards and dwarf together in the same row, the dwarfs bearing and flourishing while the others are coming forward; or they may be placed in separate

rows. The peaches, if in rows twenty feet apart, and twelve and a half feet in the row, will have quite enough room at any age, provided the long limbs are *thinned-in* from the outside every two or three years. With this care, apples may be planted much nearer than usual. None of the trees stand on exact squares; the importance of preserving straight rows for cultivation being greater than the form of the space occupied by each tree. When rows are wide apart, less room is needed between the trees in the rows.

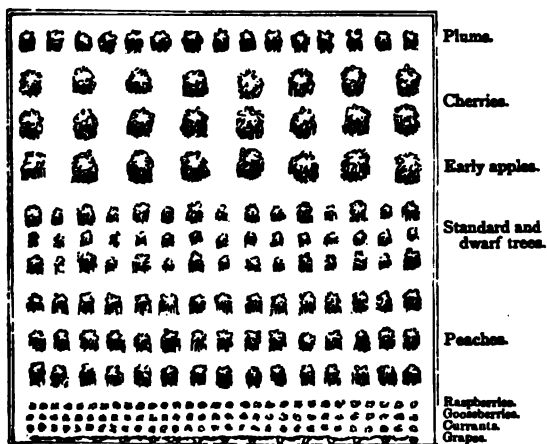


FIG. 202.—Plan of Fruit Garden.

By the arrangement we have here planned, the following trees may be planted on an acre, namely:

15 plum-trees, .	1	row, occupying 20 ft.—13 ft. in the row.
16 cherry-trees, .	2	" " 40 " 26 " "
8 early apples, .	1	" " 25 " 26 " "
16 standard pears, }	3	" " 40 " { 26 " "
29 dwarf do. }		
48 peach-trees, .	3	" " 60 " 13 " "
45 raspberry, .	1	" " 4 " 4 " "
45 gooseberry, .	1	" " 4 " 4 " "
45 currant, .	1	" " 4 " 4 " "
10 native grapes, .	1	" " 12 " 20 " "

In all 132 trees, besides, the raspberries, currants, gooseberries, and grapes.

As every cultivator would make a different selection, and different sections of the country will make this necessary, see page 142 for directions upon this point. It is hardly necessary to occupy space here on this subject, except to remark that varieties *ripening in succession* should be sought, when a family supply is the object.

It may occur to some as an objection, that too much space is given to cherry-trees. There will be, however, a decided advantage from the abundance of light and air for the trees, in diminishing the tendency to *rot* in the fruit, one of the most serious drawbacks in cherry culture. More room is given to dwarf pears than usual, on account of their proximity to the standards.

All kinds of trees may be made to conform in some degree to the room allotted to them, by thinning in the exterior occasionally.

It may be stated that each side of a square acre is about 209 feet, and that the preceding measurements of distances will all come out in accordance with the plan.

There are many who would like a larger fruit garden. The following numbers and distances are accordingly given, the mode of arrangement being the same as in the preceding plan—each side of the two-acre lot being 295 feet.

40 plums, nectarines, and apricots,	}	2 rows, occupying 40 ft.—15 ft. in row.				
40 cherries, .		2	"	"	50 "	15 "
10 early apples .	1	"	"	30 "	30 "	"
40 standard pears,	2	"	"	40 "	15 "	"
80 dwarf do. .	2	"	"	20 "	7½ "	"
80 peaches, .	4	"	"	80 "	15 "	"
11 raspberries,	}	3	"	12 "	4 "	"
50 currants,						
25 gooseberries,						
10 native grapes, .	1	"	"	10 "	20 "	"

Strawberry-bed, 13 feet wide, 295 feet long.

The grapes are near the wall or fence, and, having the strawberry-bed and small bushes in front, are not shaded.

A fruit garden in this size furnishes 290 trees, ten grape-

vines on a trellis, and 216 raspberry, currant, and gooseberry bushes, with ample space for a strawberry-bed, a portion of which should be prepared each year for planting anew, say four feet wide, which will leave eight feet for bearing-beds, and give new plantations every third year.

HOW TO OBTAIN FRUIT QUICKLY ON NEW PLACES.

This is an inquiry that often occurs in the minds of many owners of new places, or who have built new houses on unimproved spots. We can inform such residents that much may be done toward an immediate supply with proper selection and management, and that the assertion which they often hear, that "it will take a lifetime to get fruit" from a new plantation, is an absurd error.

The quickest return is from planting *Strawberries*. If set out early in spring, they will bear a moderate crop the same season. We have repeatedly obtained fine ripe berries seven weeks from the day they were set out. The second year, if the bed is kept clean, the product will be abundant. Wilson's Albany will safely yield any year a bushel from a square rod, or about two quarts a day for half a month.

Gooseberries, *Currants*, *Raspberries*, and *Blackberries* all bear at about the same period from the time of setting out. Good-sized gooseberry plants, say a foot and a half high, will give a good crop for bushes of their size the second year. We have had a bushel of Cherry currants the third summer after setting out quite small plants, from a row thirty feet long. A bush of Brinckle's Orange raspberry has been known repeatedly to bear about a hundred berries the same year that it was transplanted—the fruit, however, was not full size.

Dwarf Pears of the right sorts, and under right management, come quickly into bearing. The most prolific sorts give some returns the second year, and more afterward. Among the dwarf pears which bear soon are Louise Bonne of Jersey, Doyenne d'Été, White Doyenne, Giffard, Fontenay Jalousie, Josephine de Malines, etc. The following sorts bear nearly as early on pear stock, viz.: Bartlett, Seckel, Winter Nelis, Washington, Onondaga, Howell, Passe Colmer, Julienne.

Grapes afford fruit soon—usually beginning to bear the second and third year. The Concord, the Niagara, and Delaware are particularly recommended.

Dwarf Apples should not be entirely overlooked in the list of early bearers. Half a peck per tree is often obtained the third year from the most productive sorts.

Standard apples vary greatly in the matter of the age at which the trees bear fruit,—some producing a few at as early as four or five years, while others rarely do so until ten or twelve years old. For a record of a number of sorts see page 245.

A good supply of all the preceding will be sufficient to furnish a family with these wholesome luxuries from within a

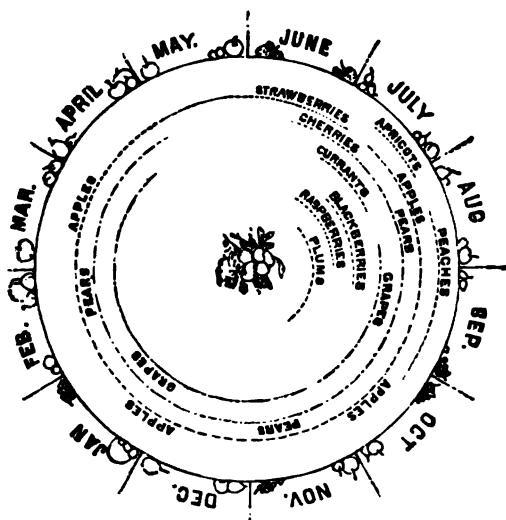


FIG. 203.—The Circle of Fruits.

year or two of occupying entirely new premises; and will not only add greatly to the comforts and attractions of home, but contribute materially to the uniform health of the occupants.

The accompanying *Circle of Fruits*, Fig. 203, shows at once to the eye what kinds make up the yearly supply through the several months, varying of course with a difference in lati-

tude, and, through winter and spring, with the skill employed in preserving from decay.

As some varieties of all kinds of fruit do better in one section of the country than in others, it is important that intending growers should select the proper sorts for their locality. This book aims to describe all of the fruits grown in the United States, of any value, and while in very many cases the places where they are sure to do well is given, it is manifestly impossible to treat this matter satisfactorily. In all cases, therefore, it is advised that parties apply to the Agricultural Experiment Station of their State, for information and advice. Such applications are always courteously received and promptly answered. A full list of these stations will be found in chapter xv.

CHAPTER XI.

MANAGEMENT OF NURSERIES.

It is impossible in a work like this to give full directions for the raising and management of young trees in the nursery. Every one who buys trees should know when they have been properly cultivated; and as some planters prefer to raise their own trees, a few leading directions will be laid down for the guidance and assistance of such as wish to become more fully acquainted with nursery management.

Soils.—The first great requisite is the selection of a suitable soil. More depends upon such selection than at first glance would seem possible. At least ten thousand good trees may be raised on an acre—worth, at twenty cents each, two thousand dollars. If the soil is perfect in every respect, and the other requisites of good stocks, transplanting, and cultivation, are attended to, there will be no difficulty in raising this amount. But if the soil be wet or sterile, or otherwise unsuited to the purpose, none of the trees can be good; one-half or nine-tenths may be stunted, crooked, and unsalable; the rest will perhaps not sell at half-price. While, therefore, a poor soil should not be accepted on any terms, it would be better to pay a hundred dollars yearly rent, if necessary, to secure one in perfect condition. A light or sandy soil will raise peach and cherry trees and often apples, and it may be worked with great ease and in all kinds of weather; but for standard pears and plums a stronger or more clayey soil is absolutely essential, and if properly underdrained, is often as good for all other trees. Every complete nursery, therefore, should either consist wholly, or in part, of a strong loam or loamy clay, which in general will require previous thorough tile draining. The necessary fertility given to such a soil will be retained several times longer than by light gravel or sand.

Nothing is commonly better than old pasture for the com-

mencement of a nursery. It should be ploughed twice or more until made perfectly mellow, which should be done the previous autumn if for planting in the spring. Or if turned over in the spring with the largest double plough to a depth of a foot or more, by means of three yoke of oxen, it will generally be found in a fine condition.

If the soil is not rich enough without manuring, it is better to apply the manure a year or two beforehand to other crops, or else to apply old rotted or composted manure. An application of wood-ashes at the rate of forty or fifty bushels per acre, if fresh, or a hundred or two, if leached, is often useful and sometimes eminently so. These ashes are well applied if mixed with the compost at the rate of one-tenth or one-twentieth of its bulk.

Laying Out.—Nurseries should be laid out so as to admit of horse cultivation. For this purpose strips of land twelve feet wide should be left on opposite sides of the nursery, at the ends of the rows, for the horse to turn about upon. Cross alleys should be left at convenient distances for carting out the trees and for the registry of the different kinds in the rows. The length of the rows between these alleys will depend somewhat upon the size of the nursery, varying from one hundred to three hundred feet.

Shelter.—In selecting a site for a nursery, the sweep of prevailing winds should be avoided; as in very windy places the young shoots from buds and grafts are apt to be blown or broken off, and the young trees bent or inclined. If necessary, belts or screens of evergreens may afford shelter from strong winds, not being placed, however, near enough to shade the trees, nor to injure their growth by the extension of their roots. On the other hand, low and sheltered valleys, being more liable to sharp night-frosts, are objectionable for the site of a nursery.

Fences and other barriers which cause large snow-drifts and a consequent breaking down of the young trees, should be avoided as much as practicable.

Seeds and Stocks.—The successful growth of the young nursery-trees depends essentially on good, vigorous, and healthy stocks. Seeds from healthy and vigorous trees, should, therefore, be always selected. It is common, in rais-

ing apple-seedlings, to procure pomace from cider-mills; wash out the seeds and plant promiscuously. If the strongest seedlings only, thus obtained, are selected for setting out good trees would be the result; but it would be better to obtain apples for this purpose from trees of known hardiness and fine growth. The same remarks will apply to the selection of pear-seed and cherry, plum, and peach stones.

Different modes are adopted for obtaining apple-seeds easily from the pomace. The following is similar to that used by most nurserymen. Make a box five feet wide, eight or nine feet long, and ten inches deep (Fig. 204); leave the lower end, *f*, one inch lower than the sides, for the water to flow over. Place this box in the bed of a brook or stream, on cross-bars or scantling, with a dam above to collect the water into a trough carrying the water into the box, and projecting six inches over it. This trough would be made of boards twelve inches wide nailed together, and the stream should be large enough to nearly fill it when flowing gently. To prevent the water from dashing into the box too furiously, two boards are first nailed together as shown at *b*, one board being eighteen inches by two feet, and the other eighteen inches by one foot. The longer board is placed on the top of the spout, and the shorter at right angles across the lower end of the spout. This serves to throw the water perpendicularly downward into the box, and at the same time to spread it out into a thin sheet. By moving this board up or down the spout, the quantity of water pouring into the box may be easily controlled.

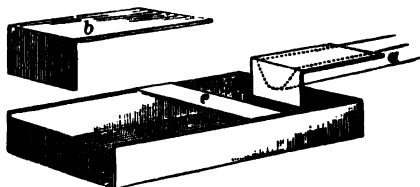


FIG. 204.—Apple-seed Washer.

One man stands on the board *c*, which extends across the box; and the other carries and deposits the pomace (well pounded to pieces) into the box at *d*, one or two bushels at a time. The man on the box then stirs the pomace rapidly with a four-tined fork, and throws out the straws. The pomace floats over the lower end (which is an inch lower than the sides), and the seeds fall to the bottom. A few back-strokes

from the lower end of the box assist in the separation of the remaining pomace. In washing a "cheese" that contains a bushel of seed, it is usual to wash it two or three times, by using a scoop-shovel. Afterward, the last cleaning process is given to it by placing the whole in a box, and then scratching a four-tined fork through it a few times. A little experience will enable any one to judge accurately of the proper quantity of water to turn on, so as to make rapid work and not carry the seed over the box.

The pomace, *fresh* from the cheese, should be drawn and placed on a board platform beside the box, and then plenty of water thrown upon it, until it is thoroughly soaked. This will render it easily beaten to pieces with a hoe. The pomace should never remain in the cheese over twenty-four hours, as it soon ferments and the seed is spoiled.

The best stocks for raising standard cherries suited to the eastern portions of the Middle States are procured from the Black Mazzard, which is the original type of the heart varieties. The fruit is to be collected when fully ripe by shaking or beating off on sheets placed below—the pulp washed off and the stones mixed with alternating layers of sand, and kept exposed to freezing and thawing until early the following spring. They are then to be planted out in nursery beds or thick rows. The spring following they may be transplanted to the permanent rows of the nursery. If the stones, after being washed from the pulp, are to be carried to a distance, they should be dried in the shade for a few days to prevent moulding. But the drying process should not be continued, as a few weeks' exposure to air will lessen or destroy their power of vegetating. Plum and peach stones may be similarly treated; but peach-stones do not as soon become injured by exposure to air as those of the smaller fruits. Plum and cherry stones keep well through winter, after being mixed with sand, by placing them in shallow pits only a few inches deep, and covering them with flat stones. They start very early in spring, and should be planted the moment the frost is out of the ground.

For dwarf cherries the seeds of the Mahaleb are used, and are treated precisely as those of the Black Mazzard already described. In the Western States the Mahaleb succeeds bet-

ter as a stock than the Mazzard; and the Morello stock, which is still hardier, answers the purpose well where the others fail, although the heart varieties, when budded into it, do not take readily unless these stocks are in the most thrifty condition.

Dwarf apple-trees are obtained by budding the common varieties on the Paradise or Doucin stock. The small Paradise apple, which grows but little larger than a currant-bush, reduces the size of the apple-tree worked upon it so as not to grow more than six or eight feet high, and to bear in two or three years. The Doucin stock is larger, and forms an apple-tree intermediate between the dwarf and the common standard. Both of these stocks are raised by layers or stools, and are commonly imported from Europe by nurserymen.

The French quince, which is employed as a stock for working such varieties of the pear as succeed well upon it to form dwarfs, is obtained by stools, layers, and cuttings. When cuttings are wanted they should be made in autumn, about ten inches or a foot long, and either planted out the same autumn or very early the following spring. They should be set in a compact soil, the earth closely pressed about them—the tips projecting an inch or two above the surface. They generally fail in a light or gravelly soil. If set out either in autumn or spring they should be covered with an inch or two of fine fresh manure. This protects them from the cold through winter, and preserves the moisture of the ground in hot weather. Many of them will take root and grow, and should be taken up in the following autumn, and heeled in and covered, ready for setting out in the nursery rows in spring.

Planting Seeds.—Seeds are usually planted in thick seed-beds for the first year—especially those of the apple, pear, plum, and cherry. The ground should be rich, mellow, and in perfect condition. As a general rule, the depth should be from three to five times the length of the seed—heavy soils requiring less depth than light ones. If there is much clay the surface should receive a sprinkling about half an inch thick of fine manure to prevent the formation of a crust. The seedlings should not be so thick as to retard each other's growth. The ground should be kept constantly mellowed

throughout the summer to promote as free a growth as possible.

The seedlings should be taken up in autumn, and either heeled in or packed in boxes with fine compact moss. Before setting out they should be carefully assorted, so that a uniform size may be in each row and no irregularities or gaps occur. Before setting out, the tap-roots should be shortened and the tops reduced. All imperfect or doubtful plants should be rejected, in order to save the useless labor of transplanting those which will not grow or take the bud.

Seedlings which have a single slender root, as the apple, may be transplanted expeditiously with a dibble, which may be easily made of an old spade-handle shod with sharp iron as in the annexed cut (Fig. 205). Other forms of this handy tool may be purchased as Fig. 206.



FIG. 205.
Dibble.

The soil being previously deep and mellow, this instrument is thrust down by the side of the stretched line, finishing the whole by a few slight lateral motions of the hand, then thrusting in the seedling held in the left hand and pressing the earth very compactly about it with the same tool. Great care is to be taken that the hole be entirely and closely filled, and that no cavities are left among the roots below.

If the weather be dry, it will be well to immerse the roots previously in mud; and in any case but few plants should be left exposed to the air at a time.

If the seedlings be valuable, as those of the pear, or have broad branching roots like the French quince, they should be set out with a spade—a trench being previously cut by the line for this purpose, or a straight furrow made by a skilful ploughman before the line is stretched. One man holds each successive seedling with the hand, placing it close to the line, while the other covers the roots with a spade, moving backward in the row.

Seedlings may be set out in the nursery row in autumn if

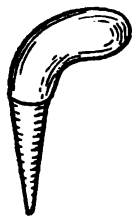


FIG. 206.—Dibble.

perfectly hardy and the soil is not subject to heaving by frost; but, as a general rule, it is safer to do all the transplanting in spring. Pear stocks should be set out very early in the spring, to prevent check in their growth, and to admit of budding the same season.

The age for setting out seedlings must depend on circumstances. Yearlings, if strong and vigorous, are always the best, and it is extremely desirable that they grow with sufficient vigor to be budded the same season. If the budding has to be deferred, a whole year of time, cultivation, and care is lost—more than enough to overbalance the additional cost of the best stocks.

Cultivation.—The soil in the nursery should be kept perfectly clear of weeds and in a state of constant cultivation—especially during the early growth of the seedlings and young trees. Hand-hoeing is expensive, and is only needed for the extirpation of weeds, and occasionally, when performed with a pronged hoe, for loosening the clayey soil between the trees. The horse should be kept constantly going, either with the plough or cultivator. Careful hands should be employed for this purpose, who can run closely to the rows without injuring the trees. Short whiffletrees should be used with the strap-traces passing the ends as figured in a previous chapter. If the plough is used it should run shallow when near the rows. It is a useful implement for turning the soil away from trees before hoeing out weeds; and it may be also used for throwing a slight covering of mellow soil against them to cover up weeds as they are just appearing at the surface.

Budding and Grafting.—Root-grafting is extensively practised by nurserymen for the apple. The mode of its performance is described in Chapter III. In setting out the root-grafts great care should be taken to pack the earth closely around them. Leaving cavities below, which is not unfrequently done by careless workmen, is sure to result in their failure. Root-grafting the pear only succeeds when strong seedlings, with well-branched roots, are taken, and the whole plant used, inserting the graft at the collar and wrapping with muslin plasters.

Nearly all other stocks are budded. The time for budding varies much with the kind of tree, and with its condition. To

prove successful, it must be done when the bark of the stock lifts freely from the wood, and also when the inserted buds have been sufficiently matured. The cherry, in general, requires budding on the Mazzard stock, about midsummer; but sometimes the growth of the stock continues so late that it may be done near the close. The Mahaleb continues to grow later, and the budding may be correspondingly deferred. On the common stock the plum requires early budding; the wild or Canada plum, used for dwarfing, continues to grow much later. The operation may be performed on the apple at any time between the maturity of the inserted buds and the decrease in the growth of the stocks. The same remark will apply to the pear on pear stocks; as the latter is frequently struck with leaf-blight, which at once checks growth, it is safest to bud the standard pear only. The peach and the quince are worked from the middle to the close of summer and the beginning of autumn. As the removal of leaves from a tree in full growth always checks it, the stocks should have the side-shoots cut away to facilitate the operation of budding when necessary, some weeks before it is done, that they may recover entirely from its effects and be in a vigorous condition for the lifting of the bark. If this has not been seasonably attended to, it may be performed without detriment the same day the buds are inserted, cutting away as little as may be convenient.

It is hardly necessary to remind the operator of the importance of securing good, well-ripened, strong buds; of keeping the shoots well shaded and fresh during the day; and of carefully registering every variety, both by tally stakes at the ends of the rows and in a book kept for the purpose.

The best and handsomest trees are made when the buds are inserted within two or three inches of the ground. Dwarf pears should be budded at the surface. Crooked growers are sometimes worked on straight stocks three or four feet high.

Where buds fail they should be rebudded if the stocks will admit; but if not, they should be grafted the following spring.

In heading-down budded stocks in spring it is important that it be done quite early or before the buds swell, especially for the pear, plum, and cherry, which are severely checked in

growth by the loss of growing buds or foliage. For the same reason all other sprouts, except from the inserted bud, should be kept constantly and closely rubbed off.

About midsummer or a little later the projecting stubs (already mentioned in Chapter III.) should be carefully pared down to the growing shoot. The sooner this work is done the better, that the cut surface may heal over, provided the shoot has become strong enough to prevent the danger of breaking out.

Digging or Lifting the Trees.—When nursery-trees have grown sufficiently for removal and transplanting, they may be taken up any time between the cessation of growth in autumn and its recommencement in spring, when the air is not freezing and the ground is open. If a whole row is to be lifted at a time, the labor may be lessened by first ploughing a furrow away from the row on each side. Then two spades made of steel and strong enough to bear the full weight of a laborer are placed on opposite sides of the tree at a distance of a foot or more from it. The blades, which are at least fifteen inches long, are thrust downward to their full length into the soil under the tree. A lifting motion raises it with the principal roots entire. Spades for this purpose, costing several dollars each, are manufactured only by the best edge-tool makers in the country. Before or at the time of removal the trees should be marked with wooden labels furnished with copper wire to fasten them to the limb. They are made of pine or other suitable wood, about half an inch wide, three inches long, and one-twentieth of an inch thick. A very thin coating of white-lead paint applied just before writing the name with a common black-lead pencil renders the letters permanent; but they will last a year or two if the letters are written on a moistened surface. If written dry they wash out in a few weeks.

Packing for Transportation.—Millions of fruit trees are every year purchased by the farmers of our country. A large majority of these are conveyed long distances from the nursery by railway. Much of their safety from injury on the road, and their consequent success when set out, depends on the manner of packing. Trees may be packed so as to open from the bundle or box, after being tumbled over iron rails a thou-

sand miles or more, as fresh, plump, healthy, and uninjured, as the moment they were lifted from the mellow soil; and they *are* sometimes packed so as to become bruised, barked, and hopelessly shrivelled before they have travelled a tenth part of that distance.

Whether encased in bundles or boxes, it is absolutely essential that trees be protected from bruising, and that the roots be kept constantly moist from the moment they are dug up till they reach their destination. The first-named object is accomplished by sprinkling straw through every portion of the mass of trees; and the latter by first dipping the roots in an artificial bed of thin mud, and then imbedding them in damp moss. The mud or the moss alone may answer for very short distances (the moss should, however, never be omitted); but as there are frequently unexpected detentions, the best nurserymen always pack about as well for a journey of fifty miles as for two thousand. The additional labor is but small—the benefit may be great.

Packing in boxes, which is always best for long distances, does not require so much practice, although as much care, as in bundles. If the trees are all well encased in straw, or properly protected by it on every side and through every part; the roots shielded from the dry air as already stated; and sufficient pressure given to them to prevent chafing and rattling, they cannot become easily injured. The boxes need the additional strength of iron hoops at the ends and, if eight or ten feet long or more, at intervals between.

To pack a bundle or bale, first provide two simple blocks of wood, like that shown in Fig. 207, into which two diverging stakes are inserted, loosely, so as to be withdrawn easily.



FIG. 207.

Place these a few feet apart, to form the trough for building the bundle. Lay the trees in this trough, perfectly parallel, and with the roots together, sprinkling straw among the stems and branches, and damp moss among the roots as the bundle progresses, until enough are ready. Fifty medium-sized trees will make a fair-sized bundle. Then tie it up with three or four twisted-straw bands, as tightly as one man can conveniently draw. This may be facilitated by using first a broad leather strap to draw the bundle together. The strap

may be two inches wide, eight feet long, with a buckle. The bundle is then ready for receiving the straw.

Next, place upon and across the little truck or wagon represented in Fig. 208, four strings or cords, then a layer of rye-straw, to form the outside coating. As the bundle is longer than the straw, the latter must be spliced, which is effected by first placing a layer toward the place for the roots of the trees, and then another layer overlapping this, toward the



FIG. 208.

tops. Place within the side-boards other portions of straw, and finally cover the top, observing now to lay the straw first on the tops, and lastly on the roots. Then tie together the ends of each of the four strings, which will hold the straw in place. Raise the bundle a few inches by placing beneath it short pieces of scantling, to admit the passing the cord under



FIG. 209.

Then apply the rope connected with the windlass, as shown in Fig. 208, by simply passing it once around the trees. A few turns of the crank will draw the bundle with great force compactly together—at which place pass a strong cord (one-fourth or one-third of an inch in diameter) and secure it by tying. Slacken the rope; move truck a foot, tighten the rope again, and add another cord. In this way proceed from bottom to top, till the straw is so firmly secured by the cords, that no handling, however rough, can displace it. By tying each coil, the rest will hold the straw if one happens to become worn off or cut. Add moss to the exterior of the roots, encase the moss in damp straw, and sew on a piece of strong sacking or gunny-cloth, and the bundle is completed, as shown in Fig. 209.

The former practice among nurserymen was to draw the

bundle together by dint of stout pulling by hand; but the present mode, by the use of a windlass, is not only many times more expeditious but much better—as it was formerly almost impossible to bind on the straw in so firm and secure a manner as to withstand all the thumps and rough-and-tumble handling of modern railway hands without displacement.

The following dimensions may be useful to those who wish to construct this packing machinery; windlass three feet high to top; posts fifteen inches apart inside; cylinder four inches in diameter; rope about eighteen feet long. The truck is about two feet wide between the wheels, eight feet long; the axles six feet apart; wheels seven inches in diameter.

When trees are always boxed, they may be secured advantageously in small bundles by this mode for placing in the boxes.

Convenient dimensions for boxes, where large quantities are to be packed, are two and a half feet square and nine feet long. They should be made of light and strong boards, and if sound half an inch in thickness will answer. Four series of battens will be necessary for the length—two at the ends, and the others at intervals of three feet between. Good battens are made of elm or other wood of equal hardness and toughness, which may be sawed for this purpose into strips two and a half inches wide and an inch and a fourth in thickness. When the boards are well nailed to these battens, the whole forms a stout box. When closely and solidly packed the lid is nailed on, and iron hoops are nailed on the outside against every batten, and extending around the box. The direction is then written distinctly with a mixture of lamp-black and turpentine, or of lamp-black and rock-oil. The following materials should be procured beforehand for packing: Boxes, with iron straps or hoops for the corners; moss, for the roots; straw, for the tops; labels, for designating the sorts; flag, oziers, or rye-straw, for tying bunches; large labels of cloth, parchment, or wood, for designating bunches; lamp-black and turpentine or rock-oil, and brush for marking boxes. If the trees are to be packed in bales or bundles, provide long straight rye or other straw, baling-cord, gunny-cloth or Russian mats, sewing-twine, large packing-needles, directing-labels, white-lead paint, and soft pencil.

After the crop of nursery-trees is removed from the ground another one should not be planted in the same place until the soil has fully recovered from the exhaustion of the first. An intermediate crop of clover turned under for manure is found useful. There should be an interval of at least two or three years before occupying the ground again with nursery; although a less time is often given in connection with heavy manuring.

CHAPTER XII.

INSECTS AND DISEASES.

INSECTS are among the most formidable enemies to successful fruit-culture. It has been computed that the losses occasioned by the curculio alone amount to at least a million of dollars annually. Planters are deterred, by the attacks of this insect, from attempts to raise the apricot, nectarine, and plum: and the market supply of apples and pears is much disfigured by it. The apple-worm is becoming scarcely less formidable. As a general rule those remedies are of little value which attempt merely to *repel* insects without *destroying* them at once. The first question, therefore, which may be properly asked when a remedy is proposed is—does it kill the insect?

While it is believed most of the injurious insects and the more common diseases which are met with by the fruit-grower will be found treated of in this chapter, there are others which occur less frequently, or become serious in their effects in restricted localities, which it has not been considered necessary to treat of here. In all such cases advice should immediately be sought from the State Agricultural Experiment station. (For list see chapter xv.)

DESTRUCTIVE INSECTS.

Tent Caterpillar (Clisiocampa Americana).—This has been a most serious enemy to the apple, and some other trees, in most parts of the country. It has its seasons of increase and decrease. Some years it has nearly stripped whole orchards; and again it has diminished in numbers in successive years, till few could be found.

There are many species which feed on the apple-leaf; but the one here alluded to is that known as the *common orchard caterpillar*, which is hatched in spring as soon as the leaf-buds

begin to open. At this time, it is not the tenth of an inch long, nor so large as a cambric needle, but it continues to increase constantly in size for several weeks, until two inches long and a quarter of an inch in diameter. During this time the colony spins a silken nest between the forks of the branches, which forms the home of the caterpillars. From

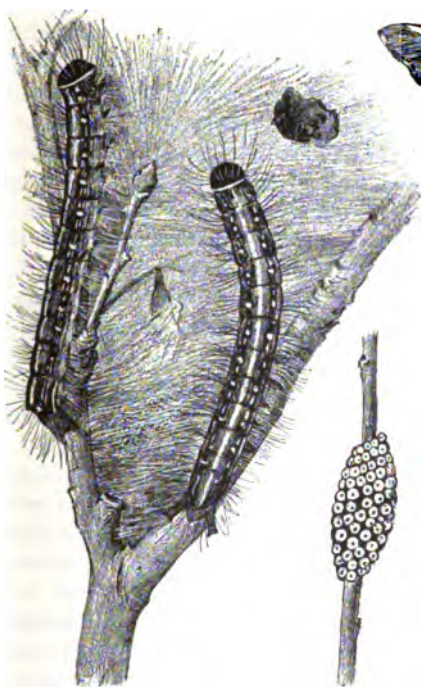


FIG. 210.

Tent Caterpillar.



FIG. 212.



FIG. 211.—Moth of Tent Caterpillar.



FIG. 213.

thence they issue in early morning and forage over the tree during the day, retiring in the evening for protection at night (Fig. 210). It then spins a cocoon and passes to the pupa state. In the latter part of summer it comes out a yellowish-brown miller (Fig. 211), lays its eggs, and dies. The eggs are deposited in cylinders or rings, containing three to five hundred each, encircling the smaller branches, and usually

within a few inches of the extremity. The accompanying figures (Figs. 212 and 213) represents one of these masses of eggs of the natural size. They remain through the winter, protected from the weather by a vesicular water-proof varnish, and hatch in spring, as just stated. Each collection of eggs makes a nest of caterpillars.

One nest is enough to defoliate a large branch, and when several are on a tree, the size and the quality of the fruit are seriously lessened.

The best mode for their destruction, is to cut off the small branches which hold the eggs during autumn or winter, and commit them to the fire. The most convenient implement is a tree-pruner (see page 102), or a sharp hooked knife, on the end of a pole, will answer nearly as well. The eggs are seen at a glance, after a little practice. If this work is done just at the moment the eggs are hatching, it will be equally efficacious, and the webs or downy coverings of the young insects render them conspicuous. Every nest of eggs thus removed, which is done in a few seconds, totally prevents a nest of caterpillars in the spring, and is far more expeditious and effectual than the usual modes of burning the nests, or brushing off the caterpillars with poles, brushes, or washing them with soap-suds, lye, or whitewash at a later period.

This caterpillar is sometimes confounded, by superficial observers, with another insect, known as the *Fall Web-worm*, which hatches out, not nearly in the spring, but after mid-summer. Both make a web or tent; but the Fall Web-worm has a wider range of trees for its food. It spins a cocoon late in summer, and does not come till the following summer. The moth or miller is white, and it deposits its eggs in an irregular mass on a leaf, where they soon hatch and the larvæ begin their work.

Dr. Fitch says: "If sulphur be dusted upon the leaves it increases the appetite of the caterpillars, whereby they eat the leaves more greedily and grow more rapidly. Yet it has been published as a remedy for these caterpillars, to bore a hole in the trunk of the tree and fill it with sulphur!" The best remedy is to be on the lookout for the eggs of these caterpillars.

After the caterpillars have hatched out in the spring, they

at once make their presence visible, and should then be burned out with some tow or waste of any kind, steeped in kerosene and wired at the end of a long pole. This should be done early in the morning or late in the afternoon, at which time they will be found clustered within their webs.

Forest Tent Caterpillar (Clisiocampa sylvatica).—This insect resembles in some particulars the tent caterpillar (*C. Americana*), but differs in being less confined to nests, and in the markings of the larva and moth. The middle of the back of the larva is marked with a row of small spatula-shaped white spots, while in the common tent-caterpillar the back has a continuous white line. On the perfect insects the former is darker between the bars of the wing; on the latter the wings are lighter between the bars. It appears only occasionally in large numbers. In the year 1867 it was quite destructive in Western New York, and received the erroneous name of "Army-worm," the true army-worm being a Southern insect, which destroys large fields of grass.

Like the common orchard caterpillar, the miller deposits its eggs in the form of a ring or cylinder, on the young twigs; but instead of the rounded form given to the mass of eggs of the orchard caterpillar, the eggs of the forest caterpillar form a distinct even-sized cylinder, with square ends, as in Fig. 214. Each mass contains about three or four hundred eggs. The eggs are small, about the twenty-fifth of an inch long and the fiftieth part of an inch in diameter. These eggs are deposited about midsummer and the larvæ hatched early in the following spring. They are very hardy, and endure any cold snap that follows. They commence spinning a web wherever they go.



FIG. 214.

The forest caterpillar spins a web close to the tree, but as it grows larger it wanders far away, and hence is generally supposed to have no web. In its travels it generally selects smooth surfaces, and seems to have a special liking to the cap-boards of board fences. It often swings down on a web from trees, and when numerous in forests proves quite annoying to persons traversing the woods. It devours the leaves of different kinds of trees, but seems to prefer the basswood, of which large trees have been stripped entirely bare. In the

orchard it is particularly destructive to the foliage of the apple. On account of its wandering character it is more difficult to attack and destroy in masses, and for this reason more care should be taken to cut off and destroy the rings of eggs before they hatch, in the orchard trees when they are found.

Several insects prey upon this caterpillar, and commonly keep it in subjection, except during those occasional years when it appears in the greatest numbers. But generally "these cannibals and parasites do their work so effectually that it is seldom exceedingly numerous for more than two successive years in one locality."

Yellow-necked Caterpillar (Datana ministra).—The larva of this moth, which usually appears in July or August, when full grown is from an inch and a half to two inches long, and



FIG. 215.

FIG. 216.

is so voracious that if undisturbed they will soon defoliate a good-sized tree. Though they spin no web, they have a peculiar habit of collecting together in masses in the noticeable position shown in Fig. 215. At such times they may easily be destroyed by burning. The perfect insect is shown in Fig. 216.

The Round-headed Borer (Saperda candida).—This insect enters the tree and cuts into the solid wood near the surface of the earth. It is a dangerous enemy; for while only a few small holes are perceived in the bark outside, it may have perforated the wood internally in all directions and reduced it to a mass of powder.

Not only the apple-tree, but the quince, mountain-ash, and hawthorn suffer greatly from the attacks of this insect.

The perfect insect is a brown-and-white striped beetle (Fig. 217), about three-fourths of an inch long, which flies at night. It deposits its eggs late in spring or the first of summer, in the bark near the surface of the ground, and sometimes in the forks of the branches. The first indication of its presence is the appearance of numerous small round holes, as if the bark had been perforated by buck-shot. These holes will soon become more visible by the ejected dust.

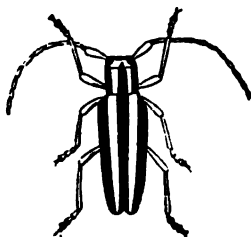


FIG. 217.—Apple-tree Borer.

Dr. Fitch gives the following distinct account of this insect:

"The beetle comes abroad in June, and drops its eggs under the loose scales of the bark, low down near the surface of the earth. The worm which hatches therefrom eats inward through the bark, till it comes to the wood. It there remains feeding upon the soft outer layers of the wood, and thus excavating a shallow round cavity under the bark, the size of a half-dollar; though where two, three, or more worms are lodged in the same tree, as they always preserve a narrow partition between their cells, one never gnawing into that of another, these cells by crowding upon one another become of an irregular form, and almost girdle the tree. The cell is always filled with worm-dust, crowded and compacted together, some of which becomes crowded out through a crack in the bark, or a hole made by the worm. And it is by seeing this sawdust-like powder protruding out of the bark, that we detect the presence of these borers in the trees. The worm continues to feed and enlarge its cell under the bark for about



FIG. 218.

twelve months, until it has become half-grown and is from a half to three-fourths of an inch in length (Fig. 218). Its jaws have now acquired sufficient strength for it to attack the solid heartwood of the tree, and it accordingly bores a cylindrical hole

from the upper part of its cell, upward in the solid wood, to a length of three or four inches or more, this hole inclining inward toward the centre of the tree, and then curving out-

ward till its upper end comes again to the bark. It then stuffs the upper end of this passage with fine chips or worm-dust, and its lower end with short fibres of wood, arranged like curled locks of hair, thus forming an elastic bed on which to repose during its pupa state. These operations being completed, it throws off its larva skin and becomes a pupa, usually at the close of the second summer, or about fifteen months after it hatched from the egg. In this state it lies through the winter, and changes to its perfect form the following spring, but often continues to lie dormant several weeks after its final change, until the season becomes sufficiently warm for it to come abroad. Awaking then into life and activity, it crawls upward, loosening and pulling down the chips and dust that close the upper end of its burrow, till it reaches the bark. Through this it cuts with its jaws a remarkably smooth round hole of the exact size requisite to enable it to crawl out of the tree. The sexes then pair, and the female deposits another crop of eggs."

Remedies.—It is nearly impossible to save a tree, unless taken early. At the very first, the insect may be cut out with the point of a knife. If deeper in the wood, it may be extracted or punched to death in its hole by a flexible wire. To prevent the insect already in the tree from emerging and laying its eggs is almost as important as preventing its entrance. A sticky fluid has recently been invented by Professor Nason, of New Brunswick, N. J., which he calls Dendrolene, which can be plastered on the trunk of the tree, from the ground a foot up, and which, as it is said never to lose its viscosity, promises well as a remedy. It is sold at a low price.

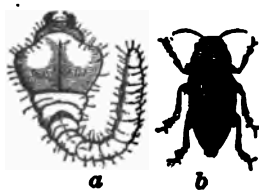


FIG. 219.

a, Larva of Flat-headed Apple Borer. b, Beetle of Flat-headed Apple Borer.

The Flat-headed Apple-tree Borer (*Chrysobothris femorata*), Fig. 219.

—The larvæ, a, after a short time in the grown cells under the bark, bore into the wood and run their tunnels upward, and after a year or possibly more emerge as a bright beetle, b. The remedy is the same as for the round-headed borer.

The Apple Maggot (*Trypeta pomonella*), Fig. 220, lives in the

pulp of the apple and tunnels it in winding channels and entirely spoils its value. It is a footless maggot, one-fifth of an inch long, and changes to a two-winged fly. It prefers the thin-skinned summer and fall apples to the winter varieties, which it rarely attacks. As it begins its destructive work late in the season and is hid out of the reach of the spraying pump, the most efficient remedy is to turn sheep into the orchard, which devour the fruit as soon as it falls, or to pick up at once the falling fruit in gardens. This insect has spread over the Eastern and Northern States. It is entirely distinct from the coddling moth, which works around the core only of the apple.

The Apple Worm or Coddling-Moth (*Carpocapsa pomonella*).—This insect has become the most formidable

enemy of the apple in the United States. It does much damage to the pear, but does not attack stone-fruit. In many orchards it ruins nearly the whole crop, and is now penetrating into States beyond the Mississippi. The moth, or miller, which may be distinguished from all other moths by a patch of burnished coppery scales at the tip of its front wings, appears first early in summer, and lays its eggs in the blossom end of the young apples, a single egg in each. The young larva soon hatches and burrows toward the core, eating as it goes. In three or four weeks, or more, it is full grown, and the young apples fall to the ground nearly at the same time. The larva passes out through a round hole which it makes, and crawls for some place to spin its cocoon, usually to the rough trunk of the tree. The moth, or miller, comes out in a few weeks for a second brood, but the apples have now grown so large that fewer fall to the ground from the injury, but they are more or less spoiled for use and market. The insects are often found in them after the crop is gathered for winter, and

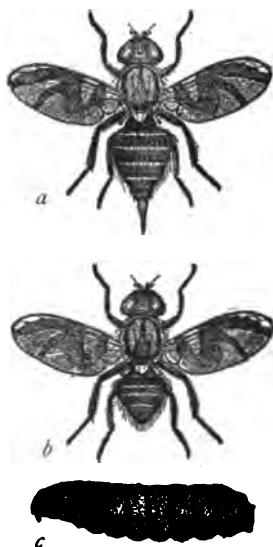


FIG. 220.—Apple Maggot.

a, Male, b, Female. c, Larva.

hiding in various places, spin their cocoons, and come out in spring to perpetuate their mischief. Professor Riley says that in a barrel of wormy apples which he broke up early in the spring he found about two hundred such cocoons; and estimating that one barrel would furnish a hundred winged females, each of which would lay two hundred eggs and spoil as many apples, and allowing a hundred apples to the bushel, he arrived at the result that two hundred bushels of apples may be ruined by the insects from one apple barrel, if allowed to escape.

The remedies for the prevention of the work of this formidable insect are of two kinds, and are founded on the destruction of the larva while in the fruit, and of the cocoons before the miller comes out. Animals which would pick up and devour the young and infested fruit as soon as it falls, would perform the first-named service. Swine, if sufficiently numerous, answer the purpose well; but as few owners of large orchards have herds large enough, it is purposed to employ sheep, which are known to eat the young apples readily, and which may commonly be had in large flocks. The bark of the trees may possibly need protection from them. In the few instances where they have been thoroughly tried, year after year, they have given smooth and fair crops.

Various methods of trapping the worms when they are about to spin their cocoons have been practised with some degree of success. The most simple and as effective as any is to wrap a band of straw, or two or three folds of old burlap twisted into a loose rope and wound snugly around the trunk of the tree. Put them on about the middle of May and examine and destroy the cocoons found in them every ten days until the apples cease dropping.

The accompanying illustrations exhibit the apple-worm in its different stages; Fig. 221, *a*, the larva; *b*, the same

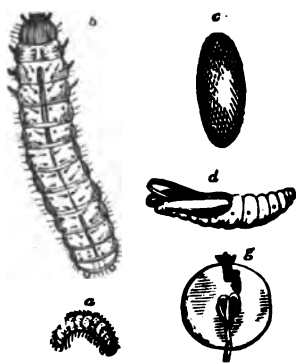


FIG. 221.—Larva of Coddling-Moth.

magnified; *c*, the cocoon; *d*, the pupa within the cocoon; *e*, the young larva, just hatched, after having been deposited within the calyx; Fig. 222, the perfect insect, known as the



FIG. 222.—Perfect Coddling-Moth.
Upper, male; lower, female.



FIG. 223.—Work of the Coddling-Moth.

“coddling-moth,” and Fig. 223 the progressive work of the larva within the apple, till it escapes.

Aphis.—Aphides, or plant-lice, frequently infest the leaves of the apple, pear, cherry, etc., Fig. 224. When they appear in vast numbers, covering the surface of the leaves and twigs, they retard growth and injure the trees by sucking the juices. They may be destroyed by a solution of whale-oil soap, or even by common soap-suds. It may be applied with a syringe; or young trees in the nursery, and their branches, may be bent over and immersed in the liquid contained in a large pail. It should be repeated as often as they reappear, and the evening is the best time to apply it. If too

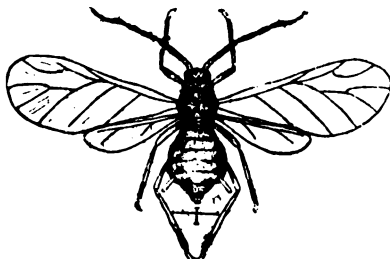


FIG. 224.—Apple Aphis, male.

strong, it may injure the leaves, and a previous trial on a single tree as a precaution is best, till the right degree of strength is ascertained.

The Woolly Aphis (*Aphis lanigera*, *Eriosoma lanigera* of later

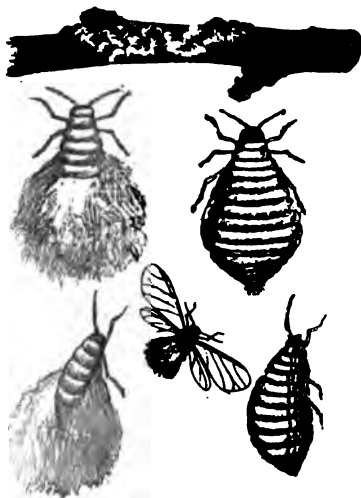


FIG. 225.—The Woolly Aphis.

naturalists), a European insect, falsely termed American blight, is a species of aphis or plant-louse, covered with long, white, cottony hair (Fig. 225). In England it has proved very destructive, and on young trees in this country it has done some injury. It is destroyed by whale-oil soap and by limewash.

The Apple-Root Aphis (*Pemphigus pyri*) penetrates the root and causes knobby excrescences, which, when numerous, check and injure the tree (Fig. 226). To destroy it, scrape the earth

away; and wash with strong soapsuds, or pour scalding water

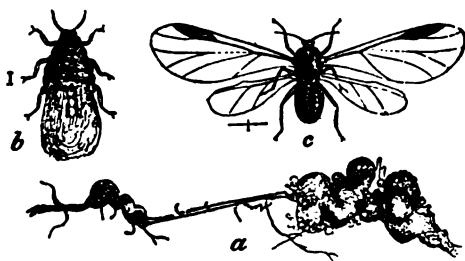


FIG. 226.—Apple-Root Aphis.—a, Infested root; b, larva; c, perfect insect.

(150° F.) upon the roots, which may be laid bare for the purpose.

The Oyster-shell Bark-louse (*Mytilaspis pomorum*) is thus de-

scribed by Dr. Fitch: "It makes its appearance as a little brown scale, one-eighth of an inch long, the shape of an oyster-shell, fixed to the smooth bark, resembling an elongated blister. This scale is the dried remains of the body of the female, covering and protecting her eggs, from a dozen to a hundred of which lie in the cavity under each scale. These eggs hatch the latter part of May, and the young lice diffuse themselves over the bark, appearing as minute white atoms, almost invisible to the eye. They puncture the bark, and suck the sap from it. The females soon fix themselves and become stationary. They die and become overspread with a substance resembling fine blue mould, which wearing off, the little oyster-shaped scale again appears in July (Fig. 227). They sometimes become so multiplied that the bark of the trunk and limbs is everywhere covered and crowded with them, and if the tree is weakened by borers, fire blight, or other disease, these bark-lice, multiplying, kill it. In years past, over all the country adjacent to Lake Michigan, every apple-tree has been destroyed by this insect."



FIG. 227.—Oyster-shell Bark-lice (slightly magnified).

The late A. G. Hanford was successful with a mixture of equal parts of tar and linseed oil, applied warm, *not hot*, early in spring, to the bark. This mixture does not continue soft and spread over the surface and close the pores so as to kill the tree, as grease would do; but it forms simply a *varnish*, which soon becomes hard, and when the tree appears in leaf and begins to grow, this varnish cracks and peels off, carrying the bark-lice with it, and leaving the bark fresh and smooth. Painting the infested branches with kerosene emulsion will generally destroy them.

The Peach Worm, or *grub* (*Ageria exitiosa*, *Trochilium exitiosum* of later authors) cuts into the bark (never far into the wood), just below the surface of the ground. It attacks the peach, nectarine, and apricot. Its presence is indicated by the exudation of gum at the root, mixed with excrementitious matter resembling sawdust. It is very easily destroyed by scraping away the earth at the foot of the trunk, and fol-

lowing the worm to the end of its hole with a knife, beneath the thin shell of bark, under cover of which it extends its depredations. If an orchard is thus examined once in spring and once in early summer, few will escape. But to exclude the insect, as a means of prevention, heap around each tree a small mound of air-slaked lime or ashes, coal-ashes, or even earth, in spring, allowing it to remain till autumn. Encasing the foot of the tree with pasteboard, or with stout oiled or painted paper during the summer, effectually prevents the deposit of eggs in the bark.

The perfect insect of the peach-worm (Figs. 228 and 229) is a four-winged moth, resembling in form a wasp, but totally dis-



FIG. 228.—Male.



FIG. 229.—Female.

Peach-tree Borer.

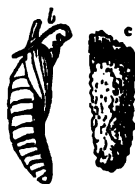


FIG. 230.—Pupa.

tinct, and in its character and habits closely allied to the butterfly and miller. It deposits from early in summer till autumn, at the foot of the tree, its exceedingly minute, whitish eggs, which soon hatch, and the larvæ or worms enter the bark. The next season they encase themselves in a sawdust-like cocoon, in their holes under the bark, and emerging as perfect insects, lay their eggs and perish. The perfect insect is very rarely seen, but is easily obtained by enclosing the pupa (Fig. 230, *b*, *c*), which is readily obtained in summer at the roots of neglected trees, beneath a glass, or in a gauze case. As this insect confines itself to the *bark*, its destruction is very easy. It rarely happens that trees are completely destroyed by it, unless they are small; death can only take place when the tree is girdled. Timely care will prevent this; the evil, in fact, is only to be dreaded by negligent cultivators.

Black Peach Aphis (*Aphis persica-niger*).—A brownish-black plant-louse infesting the leaves, twigs, and roots of young

peach-trees. It is said to be common in Delaware, but not generally distributed throughout the country. It is a difficult pest to eradicate. Spraying with kerosene emulsion would be likely to prove most effectual.

The "Cherry Slug" (*Selandria cerasi*), Fig. 231, when in large numbers, does serious injury by eating the leaves. It is sometimes very destructive to both pear and cherry trees. This animal, which is the larva of an insect, is about half an inch long, and of a dark greenish brown when filled with food. Its smooth, shining, and jelly-like skin, and snail-like appearance, have given it the name "Slug." It may be repelled by dusting the cherry leaves regularly, while wet with dew, with dry fresh ashes. Sand or pulverized earth, thrown briskly among the leaves, also repels it. Doubtless a fine dusting of white hellebore, found so effectual for the currant-worm, would destroy it.

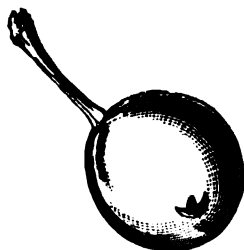


FIG. 231.

The *Curculio* (*Conotrachelus nenuphar*), represented in the annexed figure (Fig. 232), is a small insect not more than one-fourth of an inch long, of a dark-brown color, the sheaths covering the wings slightly variegated with lighter colors, the body resembling in size and appearance a ripe hemp-seed. It is distinguished by an elongation of the head, resembling a conspicuous rostrum or beak projecting from the front part of its thorax.

FIG. 232.—
Curculio.

About the time the young fruit attains the size of a pea, the curculio begins its work of destruction. It makes a small crescent-shaped incision in the young fruit, and lays its egg in the opening. The presence of the egg may be easily detected by these incisions upon the surface; the above figure (Fig. 233) represents one of these magnified twice in diameter. The egg soon hatches into a small white larva, which enters the body of the fruit and feeds upon it, causing usually its premature fall to the ground.

FIG. 233.— Young Plum,
stung by Curculio (mag-
nified twice).

The period at which the young fruit falls, after being punctured, varies with its age at the time of the injury. Those first injured drop in about two weeks; but if the stone is hard when the egg is laid, the fruit remains till near the usual period of ripening, sometimes presenting a fair and smooth exterior, but spoiled by the worm within.

The insect, soon after the fall of the fruit, makes its way into the earth, where it is transformed into the perfect insect or beetle, to lay its eggs and perpetuate its race.

The curculio travels by flying, but only during quite warm weather, or in the heat of the day. The insects mostly confine themselves to certain trees, or to the same orchard. But the fact that newly bearing and isolated orchards are soon attacked clearly shows that in occasional instances they must travel considerable distances. Indeed, they have been known to be wafted on the wind for a half-mile or more, the windward side of orchards being most infested immediately after strong winds from a thickly planted plum neighborhood. In the cool of the morning they are nearly torpid, and can scarcely fly, and crawl but slowly; hence at this time of the day they are most easily destroyed.

Their flight appears to be never more than a few feet from the ground, and successful attempts have been made to shut them out of fruit gardens by means of a tight board fence, nine or ten feet high, entered by a tight gate.

The remedies for the curculio are various. Those which merely repel without destroying the insect, and which are consequently inefficient, include such as coating the young fruit with tobacco or lime-wash, or applying salt, offensive odors, etc. Among efficient remedies, which kill the insects, are jarring them down on sheets spread under the tree, and destroying the young larvæ in the fallen fruit by means of animals confined in the orchard, or by sweeping up the fallen fruit and feeding it to swine.

Jarring down on Sheets.—Several contrivances have been proposed for spreading the sheets under the trees, on which to jar down curculios for the purpose of killing them. After trying a number, we find nothing better, and none so cheap and quickly made, as the contrivance represented in the accompanying cuts. Fruit raisers often omit their attacks until

too late, because they have no frames ready at the time. The one here described may be made in five minutes, and the sheeting when done with used for other purposes. For small or young trees, two pieces, each a yard wide and two yards long, will be sufficient. For larger trees procure wider stuff, and give another yard in length. It may be necessary for old trees to stitch two pieces together, but this can scarcely be needed where wide sheeting is at hand.

To stiffen these pieces take small rods, or long pieces of laths of a length equal to that of the sheeting, and sharpen both ends. Punch these ends into the four corners, so as to produce tight stretching, as shown in the figure (Fig. 234). A notch cut in the wood a short distance from the point will

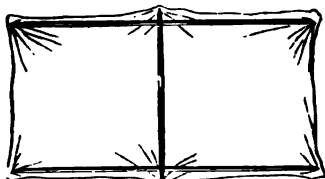


FIG. 234.

prevent the cloth from slipping too far down. Then take another rod sharpened at both ends, with a length equal to the breadth of the sheet, and insert it crosswise, placing it atop the other two rods, and bringing up the edge of the sheeting to receive its points. A notch cut near each end of the rod for the others to drop in, will prevent them from springing in; or a small nail may be driven through for the same purpose. The thing is now complete, and one person, taking the cross-piece as handle, will carry the sheets readily from tree to tree, and place them on the ground beneath,

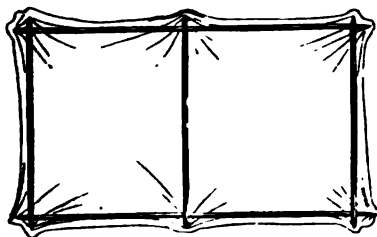
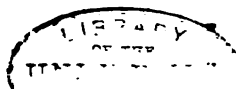


FIG. 235.

without any waste of time. By jarring with a hammer or sledge, and pinching between thumb and finger, he will destroy hundreds in a short time.

If these sheets are quite large, it will be best to place stiffeners at each end, as shown in Fig. 235. These

rods, if nothing better is at hand, may be made by cutting long green poles or shoots of bushes, and peeling the bark off. One-half to three-fourths of an inch in diameter will be large enough.



Should the insects be very abundant, they may be destroyed by throwing them into a pail of hot water, or, still better, into a small tin vessel of kerosene, by varying the contrivance as follows: Instead of the stiffeners across the ends, formed by single rods, let them be two short rods meeting in the middle. When the middle rod is pulled out, these will form a sort of hinge, so that the two sides of the sheet may be folded up like the covers of a book, and the insects thrown down into the trough thus formed, and thence into the vessel. In dislodging the insects from the tree, much depends on a sharp, stunning blow. It may be given by the stroke of a mallet, upon the short stump of one of the smaller limbs, sawed off for this purpose, and which prevents bruising the bark. Or a mallet may be thickly covered with woollen cloth encased in India-rubber, to prevent injury to the tree; but the jar is less sudden in this case. More recently the practice of inserting iron spikes in the tree, on which to strike, has been adopted with



FIG. 236.

great success. The spikes should be blunt where they enter the tree, so that striking will not drive them in further. Short pieces of iron rod answer well. Holes being bored for them, they are inserted part-way as shown in Fig. 236. On the heads of these a blow of a large hammer will bring down every curculio. When the trees are small, one spike in each tree is sufficient; when they become quite large, it will be best to insert one in each of the larger limbs, as shown at *b, b*, Fig. 237. The late David Thomas (who first proposed jarring down on sheets), in a communication to the *Genesee Farmer*, in 1832, says: "Not three days ago I saw that many of the plums were punctured, and began to suspect that *shaking* the tree was not sufficient. Under a tree in a remote part of a fruit-garden, having spread the sheets, I therefore made the following experiment: On *shaking it well*, I caught *five* curculios; on *jarring it with the hand*, I caught *twelve* more; and on *striking the tree with a stone*, *eight* more dropped on the sheets. I was



FIG. 237.

now convinced that I had been in an error; and calling in the necessary assistance, and using a hammer to jar the tree violently, we caught in less than an hour more than two hundred and sixty of these insects." With large trees, it may be necessary to jar each limb separately, by means of a pole.

The best time for this work is in the cool of the morning, when the insects are partly torpid with cold, and drop quickly. At mid-day they retain their hold more tenaciously, and more quickly escape. The work should be commenced very early in the season, as soon as the fruit begins to set, or is not larger than a small pea. With properly stiffened muslin-frames, a few minutes are sufficient for many trees, and labor equal in the aggregate to that of a single entire day may save large and valuable crops.

2. The other class of remedies includes the different means of destroying the fallen fruit as soon as it drops, and before the larvæ escape to the earth. One of these consists in beating the ground smooth or paving beneath the tree, sweeping up the fallen fruit daily, and feeding it to swine, or otherwise destroying it.

But more easily applied than the last, is the *confinement of swine* beneath the trees. They immediately pick up and destroy the punctured fruit. Experience has thoroughly established the efficiency of this method, where a sufficient number of swine has been allowed the run of the orchard. Geese and hens are, to a limited extent, useful in repelling or destroying the curculio.

To apply this remedy most efficiently, all the trees of the apricot, nectarine, and plum should be planted apart from the rest of the orchard, so that swine may be exclusively confined among them, where they should be allowed to remain the whole season, except during the period of the ripening of the fruit. It will be quite necessary, however, to protect all the young trees from these animals by encasing them in board boxes, or by tying round them a mass of sweet-brier limbs, or other densely prickly or thorny plant.

Dr. Kirtland says: "This insect, in one season, destroyed every plum on my farm, except the crop of one tree in my swine lot; that tree is bending under its load of fruit." A cultivator in western New York, by the large number of hogs

kept in his plum-yard, had abundant crops for more than twenty successive years, while his neglectful neighbors lost the greater part of theirs. It may, however, happen in thickly planted neighborhoods, that swine may not prove a sufficient protection; but we know of no instance where abundant crops have not been obtained by combining the two remedies of swine and jarring down the insects.

The curculio appears to prefer the nectarine to all other fruits for the lodgment of its eggs, and next to this the plum and apricot. A large portion of the cherry crop is frequently more or less injured, and sometimes wholly destroyed; and for this reason it may usually be expedient to give it the benefit of the protection of swine in the same enclosure with other smooth-stone fruit. The peach is sometimes destroyed, and some varieties of the apple are much stung, as indicated by the crescent-shaped incisions; but the larvæ rarely reach so far as the core, and usually perish within the flesh of the fruit.

It was formerly supposed that the instinct of this insect would prevent it from depositing eggs on branches hanging over water; but recent experiments prove that it possesses no such sagacity. The only benefit resulting from the water beneath the tree, was the destruction of the egg or larva by drowning. A partial preventive, known as the Matthews

Remedy, consisted in deeply spading the ground beneath the tree at the first appearance of the perfect insects when about to emerge from the soil. This turned them back, at least for a time, and lessened their numbers.

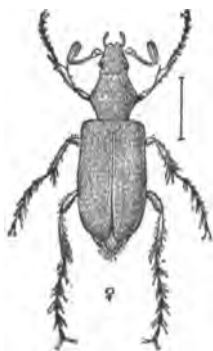


FIG. 238.—Rose Bug.

The Rose Bug (Macrodactylus subspinosus).—This beetle suddenly appears in great numbers in portions of the country and in occasional years, proving exceedingly destructive to the flowers and foliage of various plants, more particularly of the rose, apple, and grape. It has been known to devour the young fruit of the apple early in summer for successive years, entirely destroying the crop. It attacks and devours the flowers of the grape. It is one-third or half an inch long, sometimes varying in color,

but usually a mixture of gray and yellow (Fig. 238). The only effectual remedy is to examine the trees morning and afternoon while in flower, and until the fruit is one-sixteenth of an inch in diameter, and crush every beetle between the thumb and forefinger; if this is too disagreeable, carry in one hand any sort of a receptacle, in the bottom of which is a little kerosene oil and water, and drop them in one by one as they are picked off.

In garden culture,—and it is here that rose-bugs are most annoying,—cheap mosquito-netting may be spread over the trellis and drawn together below the vines, before the flowers begin to open. The grapes are safe after they are an eighth of an inch in diameter, and the netting may then be removed.

There are three distinct insects which commit depredations on currant and gooseberry leaves, namely, the Currant Span Worm, which comes out in the form of a miller or moth, the Imported Currant Worm, and the Native Currant Worm, both of the latter forming four-winged flies in the perfect state.

The Currant Span Worm (*Ellopiæ ribearia*) is represented in the annexed figure (Fig. 239), the natural size and appearance. It is about an inch long, bright yellow, with numerous black spots. The head is white, with



FIG. 239.—Currant Span Worm.

eye-like spots. It devours the early leaves of the gooseberry and currant, and when about to change, hides under rubbish, clods, or descends into the ground and changes to the chrysalis, No. 3. In two weeks it comes out in the form of a moth or miller, of a dull yellowish white, with dark-colored spots

towards the ends of the wings. The spread wings measure about an inch and a quarter. The figure (Fig. 240) represents its appearance, but is too dark.



FIG. 240.—Moth of Currant Span Worm.

Where the larvæ have been numerous, and have stripped the currant-row, this miller may be often seen in considerable numbers, flying over the bushes and laying its eggs on the twigs. Here the eggs remain till the following season, and hatch out about

the time the gooseberry and currant leaves expand, ready for devouring them.

As the eggs remain on the bushes during the time that nurserymen dig and pack them for distant conveyance, care should be taken that the insects are not thus carried to places where they were previously unknown.



FIG. 241.—Imported Currant Worm.—Larvæ.

The Imported Currant Worm (Nematus ventricosus) is represented in Fig. 241; *a a*, the larvæ in the act of devouring gooseberry leaves; *b*, an enlarged view of one of the abdominal joints, to show the position of the black spots.

In Figs. 244 and 245 is a magnified representation of the male and female, the cross lines showing the natural size. The perfect insect makes its appearance as soon as the leaves of

the gooseberry and currant are fairly expanded, and lays its eggs on the under-side of the leaves, along the principal veins, and not, like the span worm, on the young twigs. If the latter deposited eggs on the leaves they would fall to the ground, as they remain unhatched till the following season, as already stated.

The eggs of the imported worm soon hatch into twenty-legged worms, of a green color, having at first black heads and numerous black dots over the body; but after the last moulting they are entirely green, except the large eye-dots and the three yellowish joints, one next the head, and the others at the rear. They are about three-fourths of an inch



FIG. 242.—Male.

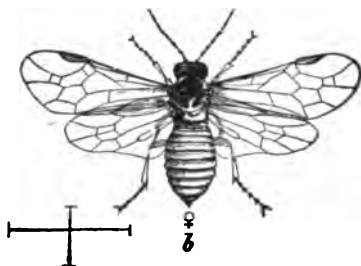


FIG. 243.—Female.

Perfect State of Imported Currant Worm.

long when full grown. When, as usually happens, they are in large numbers, they rapidly consume the leaves, and whole rows of bushes have been entirely stripped in forty-eight hours. Hence the importance of close watching and prompt attention in applying the remedies to destroy them. A single defoliation, while it does not kill the bushes, retards growth, and commonly greatly injures or prevents the ripening of a crop; and if often repeated, so that the bushes remain bare for a long time, or for successive seasons, the bushes necessarily perish.

When the larvæ attain full size, they burrow underground, or hide under scattered leaves, and spin an oval brown cocoon. After some weeks the perfect insect comes out, lays eggs as before, produces larvæ, which pass to the pupa state, and remain so till the following season.

The Native Currant Worm (*Pristiphora grossulariæ*) is

smaller than the preceding, or about two-thirds its size, and otherwise resembles it somewhat in general appearance. Unlike that worm, the male and female differ but slightly. The



FIG. 244.—Larva.

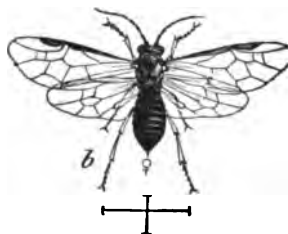


FIG. 245.—Female.

Perfect State of Native Currant Worm.

larvæ are of a uniform pale green color (Fig. 244), without any black dots, which readily distinguishes it from the two others already described, the head becoming black. It spins its cocoons among the twigs and leaves. It appears later than the Imported Currant Worm, or near midsummer, and the second brood early in autumn. Unlike the last named, the second brood also passes to the state of winged insects (Fig. 245) the same autumn, and lays its eggs on the twigs of the bushes, where they remain till the next season.

The remedy for the three species of currant worms is the same for each—namely, killing by poison. Unlike many other insects, this remedy is comparatively cheap, easily applied, and entirely successful if used promptly. It consists in dusting powdered white hellebore from a finely perforated dredging-box, or from a box covered with fine muslin, so as to give the leaves a thin dusting of this poison. It may be had at drug-stores. Do it in the morning when the dew is on, but do not wait for dew if the first worms have made their appearance. To prevent inhaling the dust, fasten the box to a short stick, apply it when there is only a faint breeze, and stand on the windward side. As soon as the insects devour it with the leaves, they curl up and die. It is desirable to give the leaves a very thin coating, and not to apply it in masses.

Grape Phylloxera.—Within a few years a small aphid has caused much injury to grape-vines in this country, and great destruction to the vineyards in France. The delicate exotic vine appears to be more extensively injured by it than the stronger and more robust American sorts. It attacks the roots, causes excrescences on the smaller fibres, and the vines ultimately die. During the first year of its attack its effects are

not conspicuous in the vines above ground; about the third year the vine dies, at which time the insects have left it, and are not discovered. Various remedies have been proposed, but none that are completely satisfactory. Probably the best preventive is to plant only strong healthy sorts, as the Concord, or those which have been grafted on these healthy sorts, and to adopt long instead of short pruning. Among imperfect remedies are soaking the soil before planting, with strong soapsuds or weak lye; sprinkling the surface with lime, ashes, sulphur, or salt; or applying carbolic acid, added to water at



FIG. 246.—Wingless Female.



FIG. 247.—Winged Female.



FIG. 248.—Female Depositing Eggs.



FIG. 249.—Root of vine infested with Phylloxera.

the rate of one per cent., by pouring into crowbar holes so as to reach the roots. Sulphuret of carbon has been applied in the same way with imperfect success. Fertilizers, to keep the vines healthy and vigorous, are probably better. There are some insects which prey upon these enemies of the vine, that often keep them in check or destroy them, among which are a species of Thrips, the Lady-bug, a Syrphus fly, and some others. Flooding the ground has been successful in a few cases, but is generally difficult and impracticable.

The Canker Worm.—Of this destructive enemy of the leaves of apple-trees, there are now two varieties recognized, the spring canker-worm (*Palacrita vernata*) (Fig. 250), the

most common, and the fall canker-worm (*Anisopteryx pomeltaria*), Fig. 251. As the young larvæ hatch in summer, they pierce small holes in the leaves, and as they grow larger they consume all except the larger veins. The larva is a measur-



FIG. 250.—Spring Canker-Worm.—Larva; female; male.

ing-worm, nearly an inch long, ten-footed, black, dull yellow or greenish, very variable in color, commonly with an ash-gray back, and a pale yellowish stripe along each side.

The canker-worm spreads slowly from one orchard to another, but is far more formidable than the tent caterpillar. It has until late years been mostly confined to portions of New



FIG. 251.—Fall Canker-Worm.—Female; male; larva.

England, but more recently has spread largely through portions of western New York, and will doubtless find its way elsewhere. It should be well known to cultivators, that they may destroy it when it first appears. It attacks both leaves and fruit; and when numerous the webs and the denuded branches together give the trees at a distance the appearance of having been scorched. As the female cannot fly, various expedients for preventing it from ascending the tree from the ground in winter or early spring have been devised.

The best remedy is to place bands of sheathing-paper six or eight inches wide, tacked around the trunks of the trees, and

then smear them with Dendrolene, or any other sticky substance which will not lose its viscosity. Before putting on the bands, smooth off the bark, so that there shall be no crevices under the paper through which the tiny worms may crawl.

Another method, less efficacious, is to wrap a band of cotton batting tightly around the trunk, in which the worms become entangled and die.

Bark-Lice.—Dr. Le Baron, State entomologist of Illinois, recommends a wash of soapsuds, of a strength varying with the age of the parts of the tree to which the application is made. A whitewash brush is used, first with strong suds, made of one part soap and three or four of water, and then a wash of a weak solution, or many times diluted, applied with a syringe. This must be done the last of May or early in June, when the young lice are just hatched.

The best means of extirpating bark-lice, according to Dr. Fitch, is that recommended by Mr. Kimball, of Kenosha. He boils leaf tobacco in strong lye till it is reduced to an impalpable pulp, and mixes it with soft-soap, which has been made cold, to make the mass about the consistence of thin paint, the object being to obtain a preparation that will not be entirely washed from the tree by the first rains. The application must be thoroughly made to the body, limbs, and twigs, or wherever a louse is detected. This should be done with a paint-brush before the buds start in the spring, and if the painting is faithfully performed the death of the lice will be assured.

San José or Pernicious Scale (Aspidiotus perniciosus), Fig. 252.—This insect first appeared in California, whence it has been gradually disseminated eastward. It is nearly round and flat, when full grown about one-eighth of an inch in diameter. It spreads all over the tree and fruit, at times literally covering it, in such cases killing it, if undisturbed, it is said in three years. If crushed when the insect is alive under the scale, a yellowish fluid exudes. It can only spread by direct contact of the living female with a live tree, either from the interlocking of the branches of an infested tree with others, or by being



FIG. 252.—San José Scale. (Greatly magnified.)

carried from one to another by birds or insects. While apples, pears, and plums seem most affected, probably no fruits may be entirely exempt.

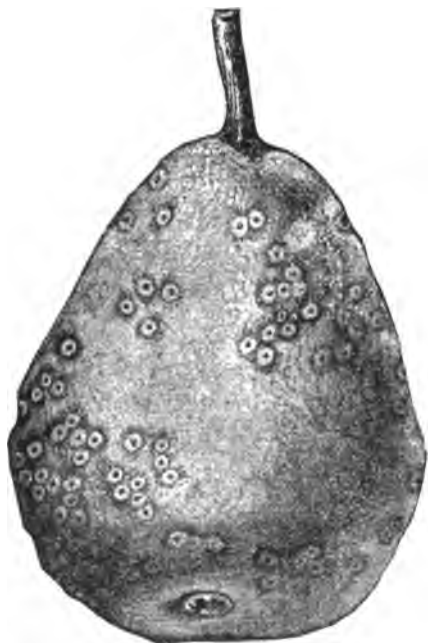


FIG. 253.—San José Scale on Pear.

Remedies.—Caustic or oily washes have thus far proved most effectual, especially when applied in the fall or winter.

Plum Scale (probably a *Leccanium*).—A new pest, not yet fully determined, has made its appearance on the plum, in western New York, and may become serious. It can most readily be detected on the smaller branches to which it affixes itself. The male is about the size of the oyster-shell bark scale, while the female grows to over an eighth of an inch in diameter, nearly round, and somewhat resembling the San José scale. Spray with kerosene emulsion, one part to four of water, directing the nozzle so as to strike the under side of the branches, as soon as the leaves fall in autumn.

The Thrips.—The following account is given by Fuller:

"These are very minute insects, scarce exceeding one-sixteenth of an inch in length. They are usually of a pale, greenish-yellow color, or nearly white. They attack the under side of the leaves of the grape, and their presence is soon shown by the pale green or yellow spots which appear upon the upper side. The thrip seldom attacks the vine in the open air, confining itself mainly to those that are grown under glass, or against a wall or building. Sometimes thrips will attack the fruit when it is nearly ripe, but usually they confine themselves to the leaves. Syringing the vine with a strong solution of tobacco-water is one of the most effectual modes of getting rid of this little pest."

Grape-vine Flea Beetle (Haltica chalybea) Fig. 256.—This is a small shining beetle about one-sixth of an inch long, usually of a steel-blue color, but often varying from green to purple. It feeds on the buds of the vine, eating out the interior, and sometimes attacks the plum. It never appears in very large numbers, and hand-picking appears to be the surest way of destroying it. It is also caught by placing a small, deep tin vessel, containing a little molasses, with its mouth up against the vine, and driving it down into the vessel by placing the hand above.



FIG. 254. — Flea Beetle. (Enlarged three times.)

DISEASES.

Blight.—A most formidable difficulty in the cultivation of the pear is the *blight*, known in its modifications, supposed or real, by the names *fire-blight*, *insect-blight*, *frost-blight*, and *frozen sap blight*. The cause is the introduction into the tree of the germs of a fungus (*Micrococcus amylovorus*). These floating in the air, wind-borne, find lodgment on all parts, the ends of the branches, the flowers, and the bark of the tree. Once established, it soon shows itself by its effects—a sudden withering and turning black of the leaves on certain limbs during rapid growth, and, while the rest of the tree remains apparently in full vigor, the evil extending downward, unless naturally or artificially checked, till the whole tree is destroyed. No thoroughly effectual remedy has as yet been

discovered. The dead branches should be immediately cut out. And, as the poison passes downward some time before its effects are visible externally, the amputation must be made two or three feet below the affected part, if the poison as well as the dead part is to be removed. Equally necessary is it that the infection of the diseased limbs be removed as speedily as possible out of the way, by burning.

Many cultivators, in fear of mutilating their trees, do not cut low enough, and leave the seeds of death remaining in the tree. Others delay for a number of days, till cure is hopeless. In extensive and malignant cases, the disaster may be difficult to subdue even by the most prompt measures; but in ordinary instances success will follow. In any event, it is better to cut away and burn by successive portions a whole tree, than to have the added evil of spreading the malady.

The practice of cutting down trees to within two feet of the ground (when not exceeding ten years of age), as soon as blight appears, has resulted in success, a new head springing up from the healthy stump. This operation, however, cannot be well performed unless the disease appears after mid-summer, or when the trees have nearly ceased growing for the season.

In nurseries all ordinary budded stock has been found comparatively free from this disease, but it is strongly recommended that when seedlings are found to be badly affected, they should be cut back within an inch or two of the ground, rather than risk its reappearance after budding.

Among preventives, a good, firm, and dry soil, and a site favoring the early ripening of the wood, and adverse to a late succulent growth, hold an important rank. Plant the trees on soil of medium fertility, and maintain an annual growth of shoots from one to two feet in length, by constant cultivation. The bark thus becomes more able to resist changes and disease, as the growth is moderately vigorous, and healthy and matured.

The attempt has been made to select those varieties least liable to blight, but results vary so exceedingly that nearly all efforts have proved fruitless. But among those which have escaped in the largest number of instances may be

named, first, the Seckel, which is scarcely ever destroyed, and White Doyenné. The Madeleine, Winkfield, and Passe Colmar appear to be more liable than the majority of sorts. Early and thorough spraying of the leaves with Bordeaux mixture is recommended as palliative treatment.

The Blight in the Apple, which sometimes kills the terminal shoots on the branches, has been variously ascribed to the sting of an insect and to the effects of the weather. The cause does not appear to have been satisfactorily ascertained. It rarely proves a formidable disaster; but sometimes the trees are much disfigured by it, and temporarily checked in growth.

Leaf Blight of the Quince (*Entomosporium maculatum*).—Trees in sod appear most liable to this fungus. It spots the leaves, and causes black spots upon the fruit, the latter often sunken. Spraying with Bordeaux mixture will hold it in check. Begin as soon as the blossoms fall, and repeat several times at intervals of about a fortnight. It is safer to spray all quince-trees; do not wait until the disease shows itself.

Pear Leaf Blight (*Entomosporium maculatum*).—This fungus appears in hot midsummer and is seldom severe in its effects, save in protracted damp weather. It proves a formidable obstacle in raising pear seedlings, attacking the leaves often by midsummer. A brown spot first shows on the leaves or fruit, and causes an immediate suspension of growth. Some varieties are more liable to crack as a result of the disease than others; and while in certain localities it renders them worthless, in others they entirely escape. In some instances the disease has gradually extended over certain varieties from one district of country to another.

Leaf-Spot of Cherry (*Cylindrosporium Padi*).—Occasionally this fungus causes great damage. It attacks the young leaves, causing them to become light yellow or more generally red, then changing to brown, when they soon fall. Spray early with Bordeaux mixture.

The *Black Knot of the Plum and Cherry* is produced by a fungus called *Plowrightia morbosa*. It first appears in early spring when the sap begins to flow, as a smooth swelling upon the limb of the tree. In the course of two or three months the bark cracks and the "knot" assumes a warty appearance; as shown by Fig. 255.

Some have attributed "black knot" to the curculio, an opinion originating from the occasional detection of this insect within the pulpy excrescences, but the most rigid search of newly formed knots has failed to detect the eggs or larvæ of the curculio, which are only occasionally found when deposited at a later stage in the large pulpy swellings.



FIG. 255.
Black Knot.

Sufficient evidence appears to have been furnished to prove that a tree, badly diseased, is infected throughout with poison; as suckers from such a tree will always sooner or later become affected. Buds from diseased trees, placed in healthy stocks, soon exhibit the excrescences. But seedlings or suckers from a healthy tree usually escape, unless in near proximity to unhealthy trees.

No certain remedy is known. Cutting off and burning all excrescences as soon as practicable after their first appearance is an old expedient and is still the best method known of combating it. If the tumors, however, break out on the trunk or main limbs, it may be difficult to do this without cutting away the whole tree. The only way, however, is to cut and continue cutting, so long as any traces remain. As a general but not universal rule, the yellow plums are not so liable to excrescences as purple varieties, unless surrounded by diseased trees.

Leaf-blight of Strawberry (*Sphærella Fragariæ*) commonly appears after the crop has been gathered, at first as brown spots scattered over the surface of the leaves, which subsequently become grayish with a red border, and finally the entire leaf assumes a mottled reddish appearance. Some varieties are much more susceptible to this fungus than others. It can be destroyed by ploughing up the plants after the first crop of berries, or kept in check by Bordeaux spraying.

Yellows of the Peach is the most dreaded and formidable disease of the peach, sometimes attacking also the nectarine and plum. It has destroyed whole orchards in portions of the country, and for a time induced the entire abandonment of the peach culture in certain localities.

The cause of this malady has not been satisfactorily ascer-

tained. It has been supposed to have arisen originally from exhaustion by deteriorated soil, overbearing, and neglected pruning and bad cultivation, but of recent years these causes are thought to have been eliminated, and the origin is still involved in obscurity. Whatever may have been its origin, it appears at present to be chiefly communicated from diseased trees. It is quickly induced by inserting the bud from an affected tree into a healthy stock. It spreads both by contact and apparently without contact. It is also probable that the stones from diseased trees cause its development after a few years' growth. Its highly contagious nature, when in its most virulent form, is indicated by the equal facility with which young and vigorous trees, and old and feeble, may be inoculated by contact.

Its infallible indications are, first, a *premature ripening of the fruit*, some weeks earlier than usual—accompanied with a rather insipid flavor and with *small bright red spots upon the skin and purple discolorations of the flesh*. These usually occur the first season, and on a part of the tree which has been first inoculated with the poison. The following season, numerous small airy shoots are frequently thrown up from the larger branches, the leaves become yellow, the whole tree assumes a sickly appearance, and eventually perishes. No instance is known where a decidedly developed case of this disease has ever been cured. When once attacked, to prevent a spread of the disease, the entire tree should be immediately removed and burned. Stones for seedlings should be procured from districts of the country where it has not been introduced.

Peach Curl of the Leaf occurs during the early part of the season, and appears to be caused by a minute internal fungus in the pores of the leaf, developed by cold weather (Fig. 258). As soon as the leaves show any sign of curl, pick every affected leaf on the tree and on the ground, and burn them. Sometimes it will not appear again. The only permanent remedy is a thrifty growth, imparted by good cultivation and pruning-back. When the disease is severe, it destroys most of the foliage, and injures and sometimes kills the tree.

Mildew of the Peach.—The growth of peach-trees is often retarded by mildew. It seizes the tender points of the shoots and young leaves, and sometimes wholly stops their growth.

It is confined to glandless, cut-leaved varieties only; such as the Early White Nutmeg, the Early Anne, and some of the earliest varieties of the Red Rare-ripe. Yellow-fleshed peaches rarely or never suffer from it. It is not often a formidable evil, although it seriously lessens the thrifty and



FIG. 256.—Peach Curl of the Leaf.

handsome appearance of some varieties while growing in the nursery.

It is a minute fungus, and may be destroyed or lessened without injury to the tree, by syringing with soapsuds on its first appearance. A mixture of lime-water with the soapsuds is preferred by some cultivators, and a subsequent dusting with sulphur has been recommended. A thrifty growth and good pruning are, however, usually the best remedies.

Powdery Mildew of the Gooseberry (*Sphaerotheca morsuvæ*) is the most destructive enemy to the growth of the gooseberry. It covers the fruit and young twigs with a brown felt-like envelope. Early spraying with Bordeaux mixture will effectually prevent it.

Powdery Mildew of the Grape (Unicornula spiralis).—A fungus attacking the surface of leaves and fruit stems, forming whity-gray patches upon the upper side of the leaf, and a mealy coating upon the stems of the bunches. A frequent cause of "shelling" of the berries. It makes its appearance in May or June, and is most rapidly developed in warm moist weather. The remedy most approved is spraying with Bordeaux mixture.

Black-Rot of the Grape (Lastadia Bidwellii) is well known to every grape-raiser. It is a fungoid growth which chiefly affects nearly or fully grown berries, showing as a dark-colored spot, which spreads until the fruit is entirely covered, after which it shrivels upon the stem. Spraying is the preventive; see page .

Bitter Rot, or Ripe Rot, of Apples (Glazosporium fructigenum).—As its name implies, this fungoid disease only attacks nearly ripe fruit. It first shows as small brown spots, which subsequently turn black. Treatment, spraying as for scab.

Black Rot of Apples (Sphaeropsis malorum) appears usually upon partially grown fruit, as dark decayed spots most frequently near the stem. No preventive of this disease is yet known.

Brown Fruit Rot (Monilia fructigena).—This disease is the familiar rot of the plum and the peach, first appearing as a small dark spot on the nearly ripe fruit. The ripe spores are easily carried by the wind and frequently destroy an entire crop. Remedy, spraying with copper solution. .

Brown Rot of the Cherry (Oidium fructigena).—Warm weather following spells of damp rainy conditions are favorable to the growth of this fungus. It attacks all parts of the tree and fruit and is especially destructive when the latter are affected. Spray.

Rots of the Quince are produced by various kinds of fungoid growths, for all of which spraying with Bordeaux mixture is generally a preventive.

Anthraxnose of the Grape (Sphaceloma ampelinum).—The attacks of this fungus are sometimes very destructive on certain varieties. It first appears on both stems and fruit as small dark spots, with pit-like depressions in the centre. As the disease progresses, the spots enlarge, generally becoming a

grayish color on the stems, which usually remain brown on the fruit, which retains its smooth skin. No reliable or certain remedy is yet known.

Anthrachnose of Raspberry and Blackberry (*Glaosporium venetum*).—A fungus which invades the growing canes of raspberries and blackberries, affecting the bark and the cellular tissue immediately beneath it. It first appears as small, distinctly round pimple-spots, coalescing as they increase in number, until they form ragged, brown patches all along the canes. The leaves also become affected, and fruits on diseased canes shrivel, without ripening. It is rarely noticed until the canes are in fruit. It is said to appear only during dry seasons, and that deep planting, with clean cultivation, will insure exemption from it.

Sun Scald is an affection of the bark of fruit-trees, especially in the Northwest, possibly arising from the side most exposed to the sun, starting into growth in the early spring before the rest of the tree. It shows itself by the trunks becoming rotten on their southerly exposures. It is said that in Minnesota more well selected and planted trees die from this cause than any other. The remedy is to protect the trunks in the fall and during winter with anything which will keep off the rays of the sun,—bind cornstalks or straw about them, or even a board tied against them on the south side will effectually guard against this trouble.

Red Rust of Raspberry and Blackberry (*Cæoma nitens*).—This fungus makes its appearance on infected plants with the unfolding of the leaves, to which it gives a yellow tinge, soon followed by the orange-red color which gives the name to the disease. Once established in the canes, the mycelium is said to be perennial. The only remedy is therefore thoroughly to cut out all diseased canes and burn them.

Quince Rust (*Rastelia aurantiaca*).—This appears in the spring on the wings and young fruit. It causes swellings of the branches, on which appear numerous white-capped pimples. If affected fruit is cut with a knife, the deep orange spores instantly follow the blade from the tips of the cut threads of the fungus. It is well established that this plant has two distinct stages in its life-history. The first is upon cedars and junipers. Wherever these trees are growing

probably even at a distance of miles, quinces are more than liable to this disease. Once it obtains foothold, it appears to develop perennially, although as its first stage is not found in plants of the Rosacæ, one quince-tree cannot infect another. There is no known remedy.

Apple Scab (*Fusicladium dendriticum*) is one of the most common diseases affecting the apple, the brownish scabs, sometimes much disfiguring and distorting the fruit, being familiar



FIG. 257.—Apple Scab.

to all (Fig. 257). It is more frequent on wet undrained soils, and spreads most rapidly in moist cool weather. Spraying with Bordeaux mixture is a satisfactory remedy.

Pear Scab (*Fusicladium pyrinum*).—This fungus is nearly related to that which causes apple scab, and its appearance and general effects are similar. It causes darkish spots on the under sides of the leaves, and on the fruit, spreading by net-like threads. Spraying with Bordeaux mixture is the best known preventive, beginning early before the buds start.

MICE AND RABBITS.—Where these animals exist, they will be sure to do more or less damage in winter by gnawing the bark. The cleaner the cultivation of the ground, the less the anger from mice. If a small mound has not been thrown up

around young trees before freezing up (which is a very perfect protection if well formed), then it will be best, after a fresh fall of snow, to tread it compactly about the bottom of the stems. The mice will not dig through the hard-trodden snow. It should be repeated with new snowfalls. Rabbits are kept away by blood or rancid grease. Rub the skin of an old piece of pork or a piece of fresh liver on the bark two and a half feet up from the ground, and their appetite for the anointed bark is spoiled. Blood is apt to be washed off by winter rains, and the application needs repeating; or the blood should be mixed with clay, which will prevent washing. Another way to exclude both mice and rabbits is to case the foot of the tree with sheathing-paper, cording it on, or nailing it on with tacks. A few slits made in the bottom edge will enable it to spread a little, where it should be sunk slightly into the soil.

Sometimes a roll of sheet iron or sheet tin is most convenient. Sheet-tin is best, and will rust less than iron, unless

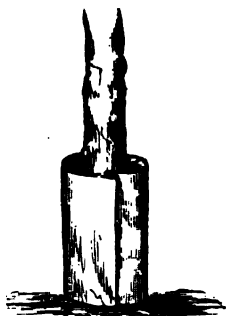


FIG. 258. — Mice Repeller.

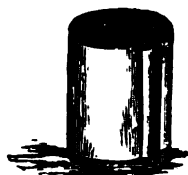


FIG. 259.

the latter is well coated with gas-tar. Roofing-tin, fourteen by twenty inches, will make four protectors to each sheet, seven inches high and three inches in diameter, costing about five cents each. They may be applied after some snow has fallen, with a little pressure and turning about. Fig. 260 represents one of these protectors, and Fig. 261 several nested together. For rabbits this method is much the best; the roll should be thirty inches high.

"It is useful to place a few shocks of unhusked corn on each acre of the orchard," remarks a correspondent of the *Country*

Gentleman; "all the rabbits want is enough to satisfy their appetite, and they prefer corn to apple-tree bark. Lard and sulphur rubbed on the bark of trees is a good preventive, and does no damage to the trees. Snares can easily be set in the run-ways, and the rabbits destroyed. Sweet apples, cut in the middle, stuck upon a stick, and raised about six inches from the ground, with strychnine pricked into the edges, will be eaten by the rabbits at night, and you will find them dead in the morning. I do not recommend putting out poison while other remedies prove effectual."

CHAPTER XIII.

THE SPRAYING OF FRUITS.

BY L. H. BAILEY,

Professor of Horticulture, Cornell University.

THE most important advance in the management of fruit plantations within the past quarter-century has been the remarkable increase in the means of checking the ravages of insects and fungi by the use of liquid sprays. The spraying of orchard trees with poisons for the purpose of destroying insects is, at least in its modern development, of American origin. Arsenic in the form of Paris-green was early used against the potato-beetle, and in 1872 Le Baron, State entomologist of Illinois, suggested its use upon trees for the destruction of the canker-worm.* As early as 1876, this poison had attained to some popularity as a means of combating the canker-worm in Illinois and in Michigan, in the latter State under the advocacy of Prof. A. J. Cook. It appears to have been as late as 1878 that the first record was made of its use in New York, but a most important discovery followed the experiment there. In the spring of that year, J. S. Woodward, of Lockport, advised Edward P. Haynes to spray his apple-trees with Paris-green to destroy the canker-worm. In the fall, Mr. Haynes observed that the apples upon the sprayed trees were less wormy than those upon the others. The results of the experiments were reported the following winter before the Western New York Horticultural Society at Rochester. It is a curious fact that similar results were observed in this very year in Iowa in sprayings made with London-purple, under the auspices of Prof. J. L. Budd and

* See Lodeman, "The Spraying of Plants," for a complete history and discussion of spraying.

John M. Dixon. Fruit-growers were at first incredulous as to the value of the arsenites for the destruction of the larva of the codlin-moth, but by 1885 sufficient experience had accumulated to entitle the practice to the careful consideration of every progressive farmer. Spraying for the codlin-moth and many other orchard insects is now demonstrated to be of the greatest value, and it is a practice which every intelligent pomologist must employ.

The practice of spraying for fungous diseases had a separate origin. It originated in Southern France, in an attempt to check the mildew of the grape, a disease which had been introduced from America. The first definite efforts to treat plant-diseases by sprays in this country were made in 1884 and 1885, by Saunders and Goff. In the latter year, the Department of Agriculture began to publish advice, at first gleaned largely from French sources, respecting the treatment of these serious disorders; and it has prosecuted the work up to the present time with a persistence and efficiency which should win the admiration of the world.

The kerosene emulsions, and like compounds used for the destruction of various scales and other sucking insects, were of still independent origin. The kerosene emulsion is an American invention. The first successful emulsion with soap was probably made by Prof. A. J. Cook, of the Michigan Agricultural College, in 1877 and 1878. It was soon after recommended independently by Hubbard and Riley as the result of investigations upon the scale of the orange; and emulsions with milk were at the same time perfected by Barnard and Hubbard as the result of work upon the cotton-worm. Various soaps and oils have long been known to be effective insecticides. As early as 1840, whale-oil soap was used in this country for the destruction of the rose-chaffer, although its application to that insect is no longer considered to be efficacious.

Spraying is only one of several practices which are of fundamental importance in the care of fruit-plantations. Tillage, fertilizing, pruning and other care are cardinal methods in pomology, and their importance is none the less because spraying has been lately proved to be so essential. Spraying is a wholly secondary operation, and its importance is the

greater in proportion as the other care of the plantation is efficient, for the value of the product is thereby heightened. Many old and neglected orchards are scarcely worth the trouble and cost of spraying. The operation of spraying is not always necessary, and it does not, therefore, always give beneficial results. Unless insect or fungous troubles are present, there is no occasion for the operation; but inasmuch as these enemies are nearly always troublesome, and as no one can definitely prognosticate their absence, spraying comes to be an insurance. The risk is too great to allow the practice to be omitted in any year in apple and some other orchards; and the practice is efficient only when it anticipates the trouble.

The amount of spraying which shall be done in any particular case, as well as its kind and seasons, depends entirely upon the conditions and the enemies which it is desired to reach. The operator must first of all make a diagnosis of what his trouble is or is likely to be. If fungous troubles are present, or are likely to be, some of the compounds of copper or sulphur must be used. If leaf-eating or chewing insects—like canker-worm, codlin-moth larva, bud-moth larva, tent-caterpillar—are at work, some arsenical poison is to be used. If scale-like or lice-like insects—as bark-louse, San José scale, aphids—are present, some soap or emulsion should be employed. In some fruits the operator can prognosticate given troubles with tolerable certainty. For instance, it is safe to assume that the apple will be attacked by the scab-fungus—except in very dry regions—and by the codlin-moth larva. Bordeaux-mixture is a specific for the former, and Paris-green for the latter. These materials may be combined and applied together with as good results as if each were applied separately. As a rule, two insurance sprayings are advised for the apple-orchard, the first one just as the blossom buds have opened, but before the flowers themselves have begun to expand, and the other about as soon as the last petals have fallen. The grower must determine if more sprayings are needed. If insect or fungous enemies are threatening, spray again. The fungous diseases are commonly most serious in wet seasons. As a general rule, there should be two sprayings for codlin-moth larvæ on the apple and pear (the apple-

worm) after the petals have fallen; but in average years the two early sprayings of Bordeaux-mixture advised above are sufficient for the scab-fungus. This first spraying will be too early to reach the codlin-moth larvæ, but inasmuch as various leaf-eating insects are common upon trees at this time, it will be well to add the Paris-green to the Bordeaux-mixture, particularly as the poison is cheap and does not in any way interfere with the application or with the fungicidal action of the Bordeaux-mixture.

It is a prevalent notion that spraying is bound to make orchards productive. Nothing could be more fallacious. The causes of unproductiveness are many. When such cause is insect or fungous injury, then spraying is a specific; but when the cause of unproductiveness is poor soil, lack of tillage and other care, poor varieties, and the like, spraying can have only a secondary and incidental effect in correcting the barrenness of the plantation. The general efficiency of spraying is well tested. The practice is now beyond the experimental stage, and the fruit-grower who does not resort to it is far behind his opportunities. There is still much to learn about mixtures, machinery, and the habits of insects and fungi; but spraying as a feature in the management of fruit-plantations rests upon as solid a basis of fact and demonstration as tillage or pruning does. This proof has been so unequivocal and so widely published, that it is doubtful if it is any longer incumbent upon the experiment stations to urge farmers to spray. The facts and methods are all accessible, and if, in the face of this evidence, the fruit-grower does not care to spray, he should be allowed to reap the harvest which he desires. It is very doubtful if laws designed to enforce spraying can be made of any service, for such laws always depend upon enlightened public sentiment for their support, and any mere perfunctory performance of the operation would profit nothing. Spraying must be deliberately and very thoroughly done if any benefit is to come of it, and such spraying is possible only when the operator is unreservedly convinced of its importance for his own plantations.

The efficacy of a spray depends upon hitting the enemy or in placing poison upon every portion of the surface upon which it works. Effective spraying, therefore, must cover

the entire surface of the plant. One completely thorough spraying, in which the plant is drenched, is more useful than a half-dozen perfunctory or half-hearted operations. The spray should be applied until the liquid begins to drip from the tree. If the operation is stopped as soon as this dripping begins, it is considered that there is no danger of turning stock into the orchard to feed upon the grass. At least, no cases of injury from such practice are on record. The number of sprayings can never make good the lack of thoroughness. Prepare for the operation in advance, preferably during the winter season. Be sure to know what the spray is to be applied for. Secure strong pumps and a variety of nozzles. Be on time with the work, do not be in a hurry while doing it, and consider that the spray protects the plant in proportion as the plant is well covered.

THE APPARATUS.

There is no one best pump or nozzle for all purposes. The operator needs different styles of tools for spraying as much as he does for working his land. The first requisite is that the pump be strong and capable of throwing much liquid. It



FIG. 260.—Knapsack Sprayer.

should be brass-lined, have a long, strong handle, a large (two inches in diameter or upward) cylinder, and it should be low and compact, so as not to catch in the limbs, or be top-heavy when mounted on a barrel or tank. As a rule, from ten to fifteen feet of hose should be used for each delivery, and one

man should manipulate only one hose. In large orchards one man should give his entire attention to pumping and driving, allowing the operator of the spray to give his entire thought

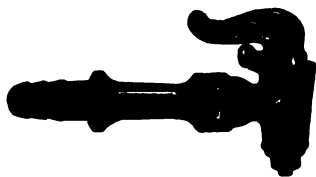


FIG. 261.—Bordeaux Nozzle.

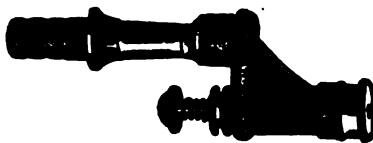


FIG. 262.—Improved Vermorel Nozzle with Disgorger.



FIG. 263.—Reducer to attach half-inch to three-quarter-inch connection.

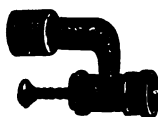


FIG. 264.—Another form of Vermorel Nozzle.

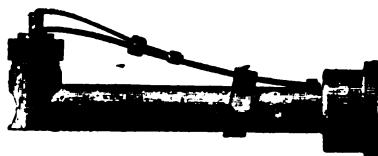


FIG. 265.—McGowen Nozzle.

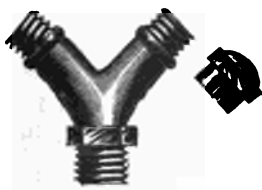


FIG. 266.—Y-Fixture for Vermorel Nozzles.

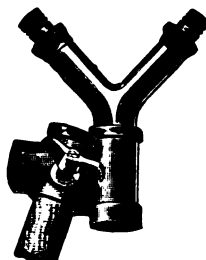


FIG. 267.—Y-Attachment for using Two Nozzles.

to his work. In tall trees the nozzle may be elevated upon a bamboo fishing-pole, or the operator may stand upon a platform above the tank. The exact form of the rig must depend

wholly upon the lay of the land and the character of the orchard. If the trees are high, far apart and well pruned, some kind of a high platform-rig will be useful. In thick orchards of low trees, a stone-boat may be used, the operator standing on the ground and raising his spray into the trees by means of a pole. This pole, with the hose secured near its top, is



FIG. 268.—Barrel Outfit Complete with Wheels.

generally handier than a gas-pipe, which some persons use. A strong three-ply half-inch rubber hose is commonly used.

The various illustrations show some of the kinds of pumps which can be confidently recommended. For spraying orchards and vineyards, they should be mounted upon large casks or tanks, and these placed upon a wagon; but for limited plantations of small fruits, various cart and wheelbarrow sprayers are useful. It is generally advisable to mount the pump on the side of the cask, for the rig is then not top-heavy, the cask is easily filled with water, and the movement of the liquid in the barrel insures more perfect agitation than occurs

if the cask stands on end. Some agitator should be employed, however, for, if the material settles, the work is likely to be very unsatisfactory. For cask-outfits it is quite as well to stir the liquid with a stick just before spraying each tree as to depend upon some of the agitating devices which are in the market. Power pumps—unless run by steam—are inefficient in orchards of large trees, because sufficient liquid cannot be thrown while the machine is passing the tree. For vineyards, dwarf pears, small fruits and potatoes, however, the power sprayers are often very satisfactory. The knapsack sprayers are useful only for small areas or small plants, or where hand-labor is cheap.



FIG. 269.

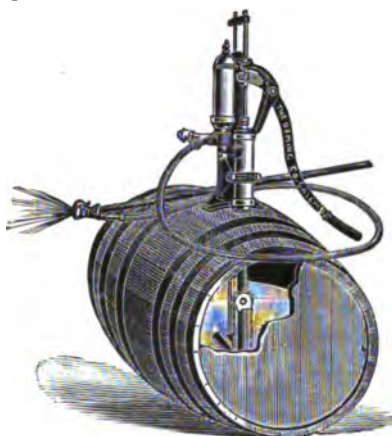


FIG. 270.

Barrel Outfits with Agitators.

The best general nozzle for tall trees is probably the McGowen. It is a self-cleaning device and can be adjusted for coarse or fine spray. It throws more liquid than some other nozzles, but for this reason it allows of very expeditious work. Every orchardist should provide himself with the Vermorel, Bordeaux, and various other nozzles, however, and he will find them all useful for particular purposes. Some of the smaller of these nozzles, like the Vermorel, may be used twin by placing them upon a Y-fixture, as shown in the engraving.

MATERIALS AND FORMULAS.

Paris-green.—This compound of arsenic (aceto-arsenite of copper) is the standard insecticide for all chewing and biting insects, such as larvæ ("worms") and most beetles. A pound of it is used in two hundred to three hundred gallons of water for fruit-plants. For apple and pear and plum trees, the denser strength is generally preferred, but for peach-trees (upon which it is seldom necessary to use it) the weaker strength is recommended. If this mixture is to be used upon fruit-trees, one pound of quicklime should be added, for repeated applications will injure most foliage, unless the lime is used. Paris-green and Bordeaux-mixture can be applied together with perfect satisfaction. Use at the rate of four ounces of the arsenite to fifty gallons of the Bordeaux mixture. The action of neither is weakened, and the Paris green loses all caustic properties. Paris-green itself has slight fungicidal properties.

It sometimes happens that material which is obtained as Paris-green contains no arsenic. If the material is pure Paris-green, it will quickly and completely dissolve in common strong ammonia, giving a beautiful, rich, dark blue, clear liquid, while any of the compounds which would ordinarily be substituted for Paris-green on account of their color and texture, will not behave in this manner in ammonia. Any insoluble residue is impurity. Chrome-green, which may be procured for Paris-green, will not dissolve in ammonia.

London-purple.—This is used for the same purposes as Paris-green, and in the same proportions. It is an arsenite of lime. Its advantages over Paris-green are its cheapness and the greater ease with which it is held in suspension in water, but these are not important merits. As it is very caustic, it should be applied with two or three times its weight of lime, or with the Bordeaux-mixture. The composition of London-purple is variable, and unless good reasons exist for supposing that it contains as much arsenic as Paris green, it is better to use the latter poison. Do not use London-purple on peach or plum trees unless considerable lime is added.

White Hellebore.—An ounce of the perfectly fresh material

is applied in three gallons of water. Apply when thoroughly mixed. This poison is not so energetic as the arsenites, and may be used a short time before the sprayed portions become edible. For insects which chew, but chiefly used for the currant-worm.

Tobacco Water.—This solution may be prepared by placing tobacco stems in a water-tight vessel, and then covering them with hot water. Allow to stand several hours, dilute the liquor from three to five times, and apply. For soft-bodied insects, especially for plant-lice.

Whale-oil Soap.—Used for various scale insects, in the proportion of one pound to five gallons of water. Some tender plants may be injured by this strength, if it is applied when they are in active growth. For San José scale, in winter, two pounds to the gallon.

Kerosene Emulsion.—Hard soap, one-half pound; boiling water, one gallon; kerosene, two gallons; dissolve the soap in the water, add the kerosene, and churn with a pump for five to ten minutes. Dilute four to twenty-five times before applying. Use strong emulsion for all scale insects, including the San José scale. For such insects as plant-lice, mealy-bugs, red spider, thrips, weaker preparations will prove effective. Cabbage-worms, currant-worms, and all insects which have soft bodies, can also be successfully treated with this emulsion. It is advisable to make the emulsion shortly before it is used.

Bordeaux-mixture.—The leading fungicide, made of six pounds of copper sulphate (blue vitriol or blue-stone), four pounds of quicklime, forty to fifty gallons of water. This is the normal or 1.6 per cent. mixture. Dissolve the copper sulphate by putting it in a bag of coarse cloth and hanging this in a vessel holding at least four gallons, so that it is just covered by the water. Use an earthen or wooden vessel. Slake the lime in an equal amount of water. Then mix the two and add enough water to make forty gallons. It is then ready for immediate use. If the mixture is to be used on peach foliage, it is advisable to add two pounds of lime in the above formula. When applied to glossy-leaved plants, it will adhere better if about a pound of hard soap be dissolved in hot water and added to the mixture. Instead of weighing out

the ingredients, the operator may simply add lime to a sulphate of copper solution and add occasionally a drop of a solution of ferrocyanide of potassium. When this ferrocyanide ceases to give a red or red-brown color upon being added to the mixture, the operator may know that sufficient lime has been added. Five cents' worth of this ferrocyanide (or yellow prussiate of potash) may be dissolved in a quart or two of water.

Prepare stock solutions for the Bordeaux-mixture, rather than to make each batch in the quantities called for by the formula, if large quantities are needed. The sulphate of copper may be put into solution and kept in this condition indefinitely, ready for use. A simple method is to dissolve forty or fifty pounds of the sulphate in as many gallons of water, pulverizing the material and hanging it in a coffee-sack in the top of the barrel. A gallon of water, therefore, means a pound of sulphate. The lime may also be slaked and kept in readiness for use. Slake it into the creamy condition familiar to masons, cover lightly with water, and then close the box or vessel to prevent the water from evaporating. When making the Bordeaux-mixture, pour the requisite quantity of the stock solution of sulphate of copper into the barrel, and then dilute with four or five times the quantity of water. Now add the creamy lime, and then add enough water to satisfy the formula. If the ferrocyanide test is used, place a spoonful of the mixture in a saucer or plate, and add a drop of the test solution. If a red color appears, the mixture needs more lime. If the test solution is added directly to a tank or barrel of the mixture, the color reaction is apt to be lost in the mass. An excess of lime insures the safety of the mixture, and it is always advisable to add a little more lime even after the ferrocyanide test is satisfied.

If the lime is thoroughly slaked and is allowed to settle before being used (only the thick, creamy portion being dipped off for making the mixture), the sediment will fall to the bottom of the slaking-box, and if the McGowen nozzle is used, the material will not need to be strained.

Ammoniacal Copper Carbonate.—Copper carbonate, one ounce; ammonia, enough to dissolve the copper; water, nine gallons; before making the solution the ammonia should be

prepared as follows: Use 26° ammonia, and dilute with seven to eight volumes of water. Then gradually add the necessary amount to the copper carbonate until all is dissolved. It is best treated in large bottles, and in them it will keep indefinitely. Dilute as required. For same purposes as the Bordeaux-mixture, and used chiefly upon fruits after they are nearly grown, and upon ornamental plants, to avoid the discoloration which follows the use of Bordeaux-mixture. Generally considered to be inferior to the Bordeaux-mixture in fungicidal action.

Iron Sulphate and Sulphuric Acid Solution.—Water (hot) 100 parts; iron sulphate, as much as the water will dissolve; sulphuric acid (commercial), 1 part.

The solution should be prepared just before using. Add the acid to the crystals, and then pour on the water. Used for grape anthracnose, the dormant vines being treated by means of sponges or brushes.

SPRAY CALENDAR.

(Adapted from Lodeman, Bulletin 114, Cornell Experiment Station.)

In the following directions, only the most common and serious orchard pests—both insects and fungi—are mentioned. The number and sequence of the sprayings are indicated by the figures. The sprayings which are commonly of least importance are placed in parentheses. No absolute rules can be given for the spraying of plants. The fruit-grower must be able to diagnose his trouble and to judge for himself how the weather, abundance of the enemy, and other conditions should modify the treatment. The calendar gives simply a few general suggestions. The operator must fill in all the details.

1. *The Orchard.*

APPLE—*Scab*.—1, Bordeaux-mixture when fruit-buds are opening, but before flower-buds expand; 2, repeat as soon as blossoms have fallen; 3, Bordeaux-mixture ten to fourteen days after the third; (4, 5, repeat 3 at intervals of about two weeks). Two or three sprayings are usually sufficient. *Canker*—

worm.—1, When first caterpillars appear apply Paris-green very thoroughly; 2, repeat 1 after three or four days; (3, 4, repeat every few days if necessary). Everything depends upon being on time. Sticky bands or traps placed around the trunks of the trees are effective in keeping the female moths from ascending. *Bud-moth*.—1, As soon as leaf-tips appear in buds, Paris-green; 2, repeat 1 before the blossom-buds open; (3, repeat 2 when blossoms have fallen). *Codlin-moth*.—1, Paris-green immediately after blossoms have fallen; 2, repeat 1, seven to ten days later; (3, 4, Paris-green at intervals of one to three weeks, after 2 especially, if later broods are troublesome). Paris-green may be added to the Bordeaux-mixture and the two applied together with excellent effect. Two sprayings are commonly sufficient for the codlin-moth larva. *Case-bearer*.—As for *bud-moth*.

PEAR—*Leaf-blight* or *Fruit-spot*.—1, Just before blossoms open, Bordeaux-mixture; 2, after fruit has set, repeat 1; 3, 4, 5, etc., repeat 1 at intervals of two to three weeks, as appears necessary. *Leaf-blister*.—1, Before buds swell in spring, kerosene emulsion, diluted five to seven times. *Psylla*.—1, When first leaves have unfolded in spring, kerosene emulsion diluted fifteen times; 2, 3, etc., at intervals of two to six days repeat 1 until the insects are destroyed. *Slug*.—Treat the same as for cherry slug. *Codlin-moth*.—Treat the same as for apple.

The true pear-blight (or fire blight) cannot be controlled by spraying, so far as known. This disease is distinguished by the uniform dying of the entire leaf, and the leaves hang upon the tree. The leaf-blight, mentioned in the last paragraph, causes the leaves to become spotted and to fall.

PLUM—*Brown-rot*.—As for peach, which see. *Leaf-blight*.—1, When fruit has set, Bordeaux-mixture; 2, 3, etc., repeat 1 at intervals of two or three weeks; use a clear fungicide after fruit is three-quarters grown. *Black-knot*.—1, During first warm days of early spring, Bordeaux-mixture; 2, repeat 1 when buds are swelling; 3, during latter part of May, repeat 1; 4, repeat 1 during middle of June; (5, repeat 1 in July). All knots should be cut out and burned as soon as discovered. *Curculio*.—Spraying is not always satisfactory; jar the trees after fruit has set, at intervals of one to three days during

two to five weeks. *Plum Scale*.—1, In autumn when leaves have fallen, kerosene emulsion diluted four times; 2 and 3, in spring, before buds open, repeat 1.

PEACH—Brown-rot.—1, Before buds swell, copper-sulphate solution; (2, before flowers open, Bordeaux-mixture); 3, when fruit has set, repeat 2; 4, repeat after ten to fourteen days; 5, when fruit is nearly grown, ammoniacal copper carbonate; 6, 7, etc., repeat 5 at intervals of five to seven days if necessary. *Curculio*.—See Plum, above.

CHERRY—Black-knot.—As for plum. *Rot*.—1, When buds break, Bordeaux-mixture; 2, when fruit has set, repeat 1; 3, when fruit is grown, ammoniacal copper carbonate. *Aphis*.—1, Kerosene emulsion when insects first appear; 2, 3, repeat at intervals of three to four days if necessary. It is essential to be on time with this treatment. *Slug*.—1, When insects appear, arsenites, hellebore or air-slaked lime; 2, 3, repeat 1 in ten to fourteen days if necessary. *Curculio*.—See plum.

QUINCE—Leaf-blight or Fruit-spot.—1, (When blossom buds appear, Bordeaux-mixture); 2, when fruit has set, repeat 1; 3, 4, etc., repeat 1 at intervals of two weeks, until fruit is three-quarters grown; if later treatments are necessary, ammoniacal copper carbonate. *Rust*.—Same treatment as for leaf-blight.

ROSE-CHAFER or ROSE-BUG.—A very difficult insect to combat. There is no good remedy. Spraying thick lime white-wash on the plants is a fairly good repellant. Kerosene emulsion is also partially efficient. Hand-picking and bagging the fruit, where these means can be employed, are always to be recommended. The insects breed in sandy lands. These breeding places should be kept in constant tith, and never seeded down.

SAN JOSÉ SCALE.—Whale-oil soap (which see) and strong kerosene emulsion. The former is considered to be the better remedy, two pounds to the gallon, in winter (in the East). Resin washes are used in California.

2. The Vineyard.

Anthracnose.—1, Before buds break in spring, sulphate of iron and sulphuric-acid solution; 2, repeat 1 after three or

four days to cover untreated portions. No treatment is wholly satisfactory. *Black-rot*.—(1, as soon as first leaves are fully expanded, Bordeaux-mixture); 2, after fruit has set, Bordeaux-mixture; 3, repeat 2 at intervals of two to three weeks until fruit is three-quarters grown; 4, ammoniacal copper carbonate when fruit is nearly grown; 5, 6, etc., repeat 4 at intervals of seven to fourteen days as required. *Downy mildew*, *Powdery mildew*.—The first application recommended under *Black-rot* is of especial importance. *Ripe-rot*.—Apply very thoroughly the later applications recommended under *Black-rot*. *Steely-bug*.—1, As buds are swelling, arsenites; 2, after ten to fourteen days, repeat 1.

3. Small Fruits.

CURRENT—*Leaf-blights*.—1, When injury first appears, before the fruit is harvested, ammoniacal copper carbonate, to avoid staining the fruit; 2, after fruit is harvested, Bordeaux-mixture freely applied; 3, repeat 2 when necessary. *Worm*.—1, When first leaves are nearly expanded, arsenites; 2, after ten to fourteen days, hellebore; 3, repeat 2 if necessary.

GOOSEBERRY—*Mildew*.—1, Before buds break, Bordeaux-mixture; 2, when first leaves have expanded, Bordeaux-mixture or potassium sulphide; 3, 4, etc., repeat 2 at intervals of seven to ten days, if necessary, throughout the summer. Avoid staining the fruit. Thorough and timely spraying will keep the mildew completely in check. *Worm*.—See currant, above.

RASPBERRY and BLACKBERRY—*Anthracnose*.—1, Before buds break, copper sulphate solution; also cut out badly infested canes; 2, when growth has commenced, Bordeaux-mixture; 3, 4, etc., repeat 2 at intervals of one to three weeks; avoid staining fruit by use of clear fungicide. Only partially successful; better treatment is short rotation, cleaning off the old patch as soon as it becomes diseased. *Orange-rust*.—Remove and destroy affected plants as soon as discovered. *Saw-fly*.—1, When first leaves have expanded, arsenites; 2, after two to three weeks repeat 1, or apply kerosene emulsion (unsatisfactory).

STRAWBERRY—*Leaf-blight*.—1, When growth begins in

spring, Bordeaux-mixture; 2, when first fruits are setting, repeat 1; 3, during fruiting season, ammoniacal copper carbonate; 4, after fruiting, or on non-bearing plants, Bordeaux-mixture at intervals of one to three weeks. Short rotations are best preventives of disease. *Saw-fly*.—Spray plants when not in bearing with arsenites, repeating application if necessary.

CHAPTER XIV.

TERMS USED IN DESCRIBING FRUITS.

It is only by a uniform and definite use of terms that descriptions can be made intelligible to the reader. Hence a full explanation of these terms becomes a matter of importance. Distinctive characters should be permanent, and not liable to variation with a change of locality, soil, season, or climate; or, if variable, the nature of such variation should be distinctly pointed out. To assist the cultivator the more fully to understand written descriptions, the devotion of a few pages to a clear explanation of the terms used in this work may prove useful.

I. GROWTH OF THE TREE, SHOOTS, AND LEAVES.

The form of growth often affords a good distinctive character of varieties, not liable to great variation. Young trees, only a few years old, usually exhibit peculiarities of growth more conspicuously than old trees of irregular spreading branches. Hence, in all cases where this character is mentioned, it refers to young trees not more than three or four years from the bud or graft, unless otherwise expressed.

1. Shoots are *erect*, when they rise nearly perpendicularly from the main trunk or stem, as in the Early Strawberry apple and Bartlett pear (Fig. 271).

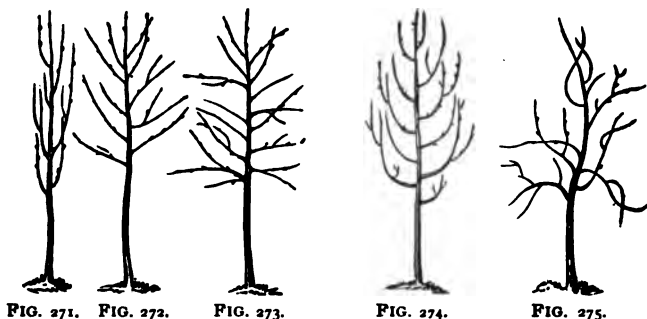
Diverging, when they deviate from the perpendicular at an angle of about forty-five degrees, considerable variation being found in the same tree; as in the Domine and Ribston Pippin (Fig. 272).

Spreading, when they more nearly approach a horizontal direction, as in most trees of the Rhode Island Greening (Fig. 273).

Drooping, when they fall below the horizontal, a form which many spreading shoots assume, as they become the large branches of older trees.

Ascending, when they curve upward, as in the Gravenstein apple, and small Red Siberian Crab (Fig. 274). Erect trees usually partake more or less of this quality, but the Early Harvest is free from it.

Irregular, when they assume no very distinct growth, but more or less a mixture of the preceding, as Black Gilliflower and Summer Bonchretien pear.



Straggling, similar to the next preceding, but with shoots more slender and curved, as Winter Nelis and Black Worcester pear (Fig. 275).

Shoots are *straight*, as in the Early Harvest and Northern Spy apples; *flexuous*, or more or less deviating from a straight line, as in the Swaar and Roxbury Russet. This distinction is very apparent and uniform in young and very thrifty trees, but not in older ones of feeble growth.

They are *stout*, as in the Red Astrachan; *slender*, as in the Jonathan apple and Winter Nelis pear.

Trees with erect straight shoots when young, usually form more regular and compact heads in older trees; and those of a spreading habit, more irregular or drooping heads.

Some trees which grow very rapidly when young, are small when of full size, examples of which are found in the Late Strawberry and Tallman Sweeting. Others at first grow more slowly, but ultimately become large, as the Esopus Spitzenburgh. Some varieties, again, continue to increase rapidly

in size at all periods, as the Northern Spy; while others of feeble growth when small, never attain much magnitude, as the Early Joe and Sine Qua Non.

2. *The color* of the shoots varies greatly in the same variety at different periods of the year, as well as with different degrees of exposure to the sun, and with a change of soil, climate, and season. When fresh or very young, all have a greenish color, but gradually assume various shades of yellow, olive, brown, red, purple, and nearly black, as the season advances, and as they become bare and are exposed to the sun and weather. For this reason, in describing the color, the terms must be relative, and can only be correctly applied by a comparison at the time with the color of other sorts. During winter, and early in the spring, the shoots of most trees become so much darker than at other times, that it is only by practice and by placing the different sorts side by side, the accuracy may be attained. Skilful culturists will readily distinguish, by a glance at the color of the shoots, many of the kinds they cultivate; but the peculiar cast is hard to describe in words, in the same way that it is impossible to describe the handwriting of an individual, so as to be known from fifty others, although many can, at a glance, know the penmanship of hundreds of different persons. A few of the most strongly marked cases, however, present peculiarities of color, which form useful points of distinction. No one, for instance, could easily mistake the *yellow* shoots of the Bartlett and Dix pears, for the dark brown or purple of the Tyson and Forelle; or the light greenish cast of the Bough and Sine Qua Non apples, for the dark color of the Northern Spy, or dark brown of the Baldwin; nor the downy or grayish appearance of the Ladies' Sweeting and Esopus Spitzenburgh, for the clear shining brown of the Gravenstein and Red Astrachan. Nearly all shoots are more or less downy at first, but the down disappears as they grow older. Hence the term must be used relatively. In plums, the smooth or downy shoots afford in most cases good distinctive points.

3. *The Buds* sometimes afford distinct characteristics. As examples, the large, compact, and projecting buds of the Summer Bonchretien always contrast strongly with the smaller, more rounded, and softer buds of the Madeleine.

Buds are large on the Swaar and Golden Sweet, small on the Tallman Sweeting and Rhode Island Greening.

4. *The Leaves*, in a large number of instances, are of use in distinguishing different varieties.

They are *even* (not wrinkled), as in the Bartlett pear and Baldwin apple (Fig. 276).



FIG. 276.—Even Leaf.

FIG. 277.—Waved Leaf.

FIG. 278.—Wrinkled Leaf.

Waved as in the Tallman Sweeting and Beurre d'Aumalis pear (Fig. 277).

Wrinkled, when the waves are shorter and more irregular, as in Green Sweet (Fig. 278).

Flat, as in the Madeleine and Skinless pears (Fig. 279).

Folded and recurved, as in the Easter Pear and Bonchretien (Fig. 280).

FIG. 279.
Flat Leaf.FIG. 280.
Folded Leaf.FIG. 281.
Erect Leaf.FIG. 282.
Drooping Leaf.

Large and wide, as in the Red Astrachan and Huling's Superb.

Narrow, as in the Dyer apple, and Van Mons' Leon le Clerc pear.

Erect, as in the Early Strawberry (Fig. 281).

Drooping, as in Domine (Fig. 282). But these two last are indistinct characters, and only to be resorted to in a very few remarkable instances, as most leaves are erect on new shoots, and become spreading or drooping as they grow older.

The *color* of the leaves may sometimes assist in description,

as *light green* in the Yellow Bell-flower and Rambo; *deep green*, as in the Rhode Island Greening; and *bluish green*, as Peck's Pleasant.

The *serratures*, or *saw-teeth markings on the margins of leaves*, are characteristics of importance, in many varieties of the apple, and on the peach they are so well defined as to form a basis of the classification of varieties. The latter will be found particularly described in the separate chapter on the peach.

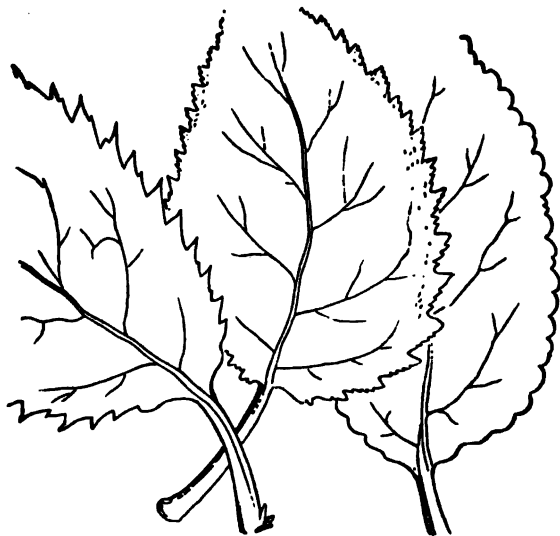


FIG. 283.—Sharply Serrate. FIG. 284.—Double Serrate. FIG. 285.—Crenate.

Leaves of apples are—

Serrate, or cut with teeth like those of a saw.

Sharply serrate, when every serrature ends in a sharp point, as in the Fall Pippin (Fig. 283).

Doubly serrate, when the serratures themselves are again minutely serrated, as in the Vandevere and Drap d'Or (Fig. 284).

Coarsely serrate, as in the Swaar.

Crenate, when the teeth are rounded, as in the Esopus Spitzenburgh (Fig. 285).

Obtusely crenate, when the teeth are unusually rounded, as in the Bough.

Finely crenate, when the teeth are small, as in the Summer Queen.

When the serratures are partly rounded, and irregularly and rather deeply cut, they become *toothed*, as in Ladies' Sweeting (Fig. 286).

Many varieties present intermediate degrees, as—

Serrate-Crenate, partaking somewhat of both, as the Jersey Sweeting and Summer Rose.

Crenate-toothed, as in Bevan's Favorite.

Serrate, slightly approaching toothed, as in Rambo.

5. *The Flowers*.—In apples, pears, cherries, and most other kinds, but little difference exists in the flowers. In the peach and nectarine, however, an important division in classification is made by the great difference between those with large and small petals; one class, including the Early Ann, Grosse Mignonne, and others, having large, showy flowers; and another class, comprising the Early Crawford, George IV., and many more, having flowers with small, narrow petals.

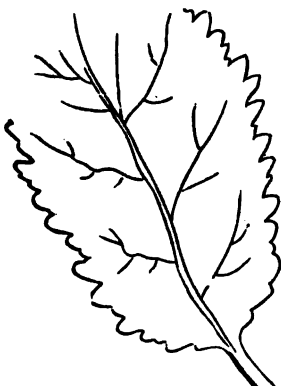


FIG. 286.—Toothed Leaf.

II. FORM OF THE FRUIT.

In the following pages, the *base* of a fruit or any other part or production of a tree is the portion toward the branch or root. This is in accordance with the language universally adopted in describing plants. It has, however, been more or less departed from in the common language used to describe fruits, and especially so as applicable to the pear. This deviation from scientific accuracy tends to confusion, and if simplicity of expression is sought, ambiguity must be avoided. The apex of the

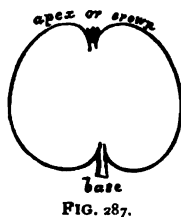


FIG. 287.

stalk of a fruit, however, to avoid the chance for a mistake, may, in all cases, be termed the *insertion*.

The term *apex* should be understood as applying to the part most remote from the branch or root. In fruits, it is the part opposite to the insertion of the stalk. In pears, this part is usually denominated the *crown*.

The *axis* is a line connecting the base and apex.

A *longitudinal section* is made by cutting an apple from base to apex.

A *transverse section*, by cutting it at right angles to the axis.

The *length* is the longitudinal diameter; the *breadth* the transverse diameter.

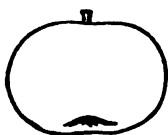


FIG. 288.—Oblate.

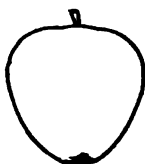


FIG. 289.—Conical.

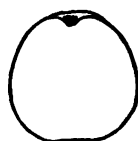


FIG. 290.—Ovate.

A fruit is *round* when nearly spherical, as the Fameuse and Green Sweet.

Roundish, when varying slightly from round, or when the length and breadth are nearly equal, as the Dyre and Gravenstein.

Oblate, *flat*, or *flattened*, when the height is much less than the breadth, as the Rambo and Maidens' Blush (Fig. 288).

Conical, when tapering from the base to the apex, as Bullock's Pippin (Fig. 289).

Ovate, or egg-shaped, when the length rather exceeds the breadth, with a rounded taper from base to apex, as in the Esopus Spitzenburgh (Fig. 290).

Obovate, or reversed ovate, is when the smaller end of an egg-shaped fruit is at the base, as the Buffum and Dearborn Seedling pears (Fig. 291).

Oblong, when the length exceeds the breadth, and the sides are nearly parallel, as Kaighn's Spitzenburgh (Fig. 292).

Obtuse, when the parts are rounded or blunt.

Acute, when any part as the neck of a pear, tapers to nearly a point (Fig. 293).

Fruits may partake of forms variously combined, as—

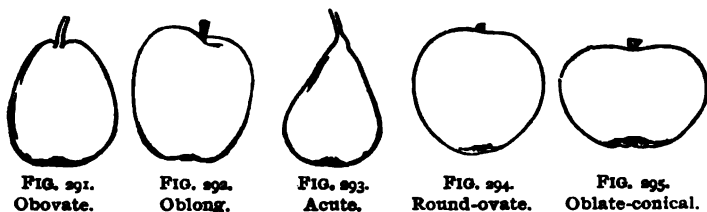
Round-ovate, when nearly round with a slight rounded taper to apex, as Ladies' Sweeting (Fig. 294).

Round-conical, nearly the same as the last, but with the taper less rounded.

Oblong-conical, as the Yellow Bell-flower.

Oblong-ovate, as the Black Gilliflower.

Oblate-conical, as the Rhode Island Greening and Hawthorn-den (Fig. 295).



Depressed, pressed down, sunk or shortened, applied to the apex of peaches, strawberries, etc.

Flattened at the ends, when the base and apex only are flattened, as the Winter Pearmain. An oblong fruit, though not flat, may be flattened at the ends; a conical fruit may be flattened at base.

Compressed, pressed together, when the sides are flattened, as in some apricots, plums, etc.

The **CAVITY** is the hollow in which the stalk or stem of a fruit is placed (Fig. 296).

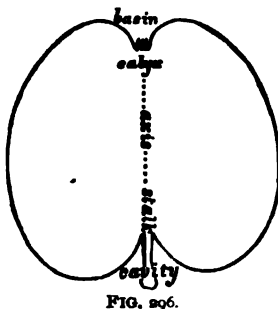
The **BASIN** is the depression which contains the calyx, eye, or remains of the blossom (Fig. 296).

A cavity may be *shallow*, *narrow*, *deep*, or *broad*.

It may be *obtuse*, or somewhat blunt or rounded, at bottom, as in the Petre pear and Pomme Grise apple (Fig. 297).

Acute, when simply ending in a sharp point at bottom, as the Baldwin (Fig. 298).

Acuminate, when ending in a long-drawn-out taper, as the Fall Pippin (Fig. 299). The Holland and Fall Pippin are dis-



tinguished from each other by the rather obtuse cavity of the former, and acuminate cavity of the latter.

The BASIN is always narrow in any fruit having a narrow or pointed apex (Fig. 302); it is usually wide in fruits having a



FIG. 297.
Obtuse Cavity.



FIG. 298.
Acute Cavity.



FIG. 299.
Acuminate Cavity.

wide or obtuse apex, as the Rambo (Fig. 300); but where the rim or boundary is broad and obtuse, the basin may be narrow, as in the St. Lawrence and Gravenstein (Fig. 303).

It is *distinct* when well defined.

Abrupt, when the depression breaks off suddenly from the rim (Fig. 301).

FIG. 300.—Wide Basin.

FIG. 301.—Abrupt Basin.



FIG. 302.—Narrow Basin.



FIG. 303.—Narrow Basin.

Even, when not furrowed or wrinkled.

Angular, with several corners.

Wrinkled, having small irregular hollows and ridges.

Waved, with gentle and irregular undulations of surface.

Furrowed, when more regularly channelled.

Plaited, having small, straight, and regular ridges.

Ribbed, with larger and more obtuse or rounded ridges.

PEARS have peculiar forms which render some additional terms necessary:

Many pears have a *neck*, or narrower part toward the stalk, and a *body*, or larger part toward the crown (Fig. 304).

They are distinctly *pyriform* when the sides formed by the

body and neck are more or less concave or hollowed, as in Fig. 304, shown by the dotted lines.

Turbinate, or top-shaped, when the body is nearly round and a short rounded acute neck, as in the Bloodgood (Fig. 305).

The form of different pears is further distinguished by the form of the different parts:

The neck may be long, as in the Calebasse.

Narrow, as in the Bosc (Fig. 306).

Short, as in the Glout Morceau (Fig. 307).

Obtuse, as in the Bartlett.

Acute, as in the Jargonelle (Fig. 308).

Distinct, as in the Bosc.

Obscure, as in the Seckel.

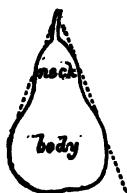


FIG. 304.
Pyriform.

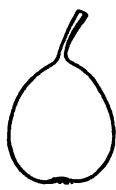


FIG. 305.
Turbinate.



FIG. 306.
Narrow Neck.



FIG. 307.
Short Neck.



FIG. 308.
Acute Neck.

The body may be *heavy* or *large*, when greatly exceeding in size the neck, as the Catillac.

Light or *small*, when not much larger than the neck, as the Washington; in which case the fruit approaches oblong in form.

Oblate, or flattened, as in the Frederick of Württemberg.

Round, as in the Jargonelle.

Conical, as in the Vicar.

Ovate, as in the Marie Louise.

Cultivation influences considerably the form of pears. Thus, on a young, thrifty tree, the Seckel pear has a slight neck; on an old, heavily laden tree, the neck is obsolete. The body, when ovate or slightly conical on young trees, becomes rounded on older trees, and even flattened in rare instances.

CHERRIES may be *round*, *cordate* or heart-shaped, or *ovate*.

STONE FRUITS usually have a furrow on one side, extend-

ing from the stalk to the apex, termed a *suture* (literally meaning a *seam*), which sometimes occurs on both sides. It is *large*, when wide and deep; *distinct*, when clear or well defined; *obscure*, when faint; *obsolete*, when not existing, or only a faint line on the surface.

COLOR OF FRUIT.—The lightest-colored fruit is white, as the Snow peach; next, yellowish-white; pale yellow; yellow; and deep yellow. The addition of red produces, successively, orange yellow, orange, orange red, rich warm red. Shades of red—clear red, crimson when darkened, purple when blue is added, violet less blue than in purple. Amber is a very light yellowish-brown. Fawn color is a light reddish-brown, with a slight admixture of gray.

A fruit is *striped*, when in alternating broad lines of color.

Streaked, when the lines are long and narrow.

Marbled, when the stripes are wide, faint, irregular, or waving.

Blotched, of different abrupt shades, without any order or regularity.

Clouded, when the blotches are broader and more softly shaded.

Stained, having the lighter shades of a blotched or clouded apple.

Splashed, when the stripes are much broken and of all sizes.

Mottled, covered with nearly confluent dots.

Dotted, when these dots are more distinct.

Spotted, when the dots become larger.

TEXTURE OF FRUIT.—*Hard*, those which need the artificial aid of cooking to soften them sufficiently, as the Catillac pear.

Breaking, when tenderer than the preceding, but not yielding to the simple pressure of the mouth, as the Summer Bonchretien.

Buttery, when the flesh forms a soft mass, yielding to the pressure of the mouth, as in the White Doyenné and Seckel pears.

Melting, when the flesh becomes nearly or entirely liquid by this pressure, as in the Madeleine. These qualities may be combined, as breaking and melting, in the Washington; breaking and buttery, in the Onondaga; buttery and melting, in the Tyson, and in most of the best varieties of the pear.

The texture may be fine, granular, coarse, gritty, fibrous, tough, crisp, or tender.

THE FLAVOR may be *sweet*, *neutral*, *slightly sub-acid* or mild sub-acid, *sub-acid*, *acid*, *very acid*, or *austere*; *aromatic* or spicy; *perfumed*, or possessing odor, and with more or less of a shade of musk; *astringent*, usually a defect, but sometimes an excellent quality, if in a very minute proportion; *rough*, astringent and austere; *vinous*, rich, high-flavored, and rather acid; *sugary*, or saccharine, sometimes nearly sweet, possessing the qualities of sugar, which may be mixed with acid.

THE QUALITY is designated by *first*, *second*, and *third* rates; and fruits perfectly worthless by still lower grades. A second-rate fruit, to be worthy of cultivation, must possess other good qualities in a high degree, as hardness, productiveness, fair appearance, etc. Very few fruits, as low as third rate, can ever be worth retaining, and only for extreme earliness or other uncommon quality. Fruits that possess desirable qualities are usually designated by three degrees of flavor; the lowest, including the best of second-rate fruits, or "good second rate," are termed *good*; the lower grade of first-rate fruits are termed *very good*, or *fine*; and the highest quality of all are *best*, *very fine*, or *excellent*. Examples—Maiden's Blush apple, Napoleon pear, Lombard plum, and Crawford's Early peach, are *good*; Rhode Island Greening, Bartlett pear, Graffion or Bigarreau cherry, and Red Gage plum, are *very good* or *fine*; and Swaar apple, Seckel pear, Downton cherry, and Green Gage plum, are *excellent* or *best*.

CHAPTER XV.

AGRICULTURAL EXPERIMENT STATIONS.

IN the year 1862, while the nation was in the throes of the Civil War, Congress found time to consider and enact a bill providing for the establishment in each State and Territory of a station for scientific investigation and experiments respecting the principles and applications of agricultural science, and for diffusing among the people such useful and practical information. During the thirty-four years since the act became a law, forty-eight stations have been established, one in every State and Territory, and several with two or more. The results already attained by the hundreds of able and painstaking men connected with these institutions are of the utmost value. The bulletins constantly emanating from them, embodying the results of their enlightened research, conveying information and advice of the greatest practical value to every cultivator of the soil, cannot fail to add to their successes, to lessen the possibilities of disappointment, and to increase the comfort and enjoyment of the individual and the wealth of the nation.

These bulletins are sent, on application, free to the residents of every State in which the station is located. From these stations may be obtained the most reliable suggestions and advice as to the varieties of fruit of every kind, suited for cultivation in their State. No one should plant large orchards without first corresponding with his Agricultural Experiment Station.

In consequence of the greater knowledge and accuracy concerning the adaptability of various fruits to the different States thus at the command of every one, the lists of fruits recommended for special States, which previous editions of this work contained, have now been omitted.

The Acts of Congress establishing Agricultural Experiment Stations, and a full list of them, are here given, together with their post-office address. Communications should in all cases be addressed "Director, Agricultural Experiment Station," followed by the post-office and State.

ACT OF 1887 ESTABLISHING AGRICULTURAL EXPERIMENT STATIONS.

AN ACT to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided,* That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the legislature of such State or Territory shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their dif-

ferent stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purpose of this act. It shall be the duty of each of said stations annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

SEC. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 5. That for the purpose of paying the necessary ex-

penses of conducting investigations and experiments and printing and distributing as the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: *Provided, however,* That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SEC. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SEC. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second, aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural

college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made to such separate agricultural college or school, and no legislature shall by contract express or implied disable itself from so doing.

SEC. 9. That the grants of moneys authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants: *Provided*, That payment of such instalments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the Secretary of the Treasury.

SEC. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

Approved, March 2, 1887.

EXTRACT FROM AN ACT MAKING APPROPRIATIONS FOR THE
DEPARTMENT OF AGRICULTURE FOR THE FISCAL YEAR END-
ING JUNE THIRTIETH, EIGHTEEN HUNDRED AND NINETY-
FIVE.

AGRICULTURAL EXPERIMENT STATIONS: To carry into effect the provisions of an act approved March second, eighteen hundred and eighty-seven, * * * and to enforce the execution thereof, seven hundred and forty-five thousand dollars, twenty-five thousand dollars of which sum shall be payable upon the order of the Secretary of Agriculture to enable him to carry out the provisions of section three of said act of March second, eighteen hundred and eighty-seven; and the Secretary of Agriculture shall prescribe the form of the annual financial statement required by section three of the said act of March second, eighteen hundred and eighty-seven; shall ascertain

whether the expenditures under the appropriation hereby made are in accordance with the provisions of the said act, and shall make report thereon to Congress; and the Secretary of Agriculture is hereby authorized to employ such assistants, clerks, and other persons as he may deem necessary, and to incur such other expenses in travelling, stationery, and office fixtures as he may find essential in carrying out the objects of the above acts, and the sums apportioned to the several States shall be paid quarterly in advance. And the Secretary of Agriculture is hereby authorized to furnish to such institutions or individuals as may care to buy it copies of the card index of agricultural literature prepared by the Office of Experiment Stations, and charge for the same a price covering the additional expense involved in the preparation of these copies, and he is hereby authorized to apply the moneys received toward the expense of the preparation of the index.

LIST OF EXPERIMENT STATIONS.

ALABAMA.

Agricultural Experiment Station of the Agricultural
and Mechanical College of Alabama,

AUBURN, ALA.

Canebrake Agricultural Experiment Station,

UNIONTOWN, ALA.

ARIZONA.

Agricultural Experiment Station of the University of
Arizona,

TUCSON, ARI.

ARKANSAS.

Arkansas Agricultural Experiment Station,

FAYETTEVILLE, ARK.

CALIFORNIA.

Agricultural Experiment Station of the University of
California,

BERKELEY, CAL.

Outlying Stations.—Southern Coast Range Station, Paso Robles, Cal. ; San Joaquin Valley Station, Tulare, Cal. ; Sierra Foothill Station, Jackson, Cal. ; South California Station, Chino, Cal. ; East Side Santa Clara Valley Viticultural Station, Mission San Jose, Cal. ; Chico Forestry Station, Chico, Cal. ; Santa Monica Forestry Station, Santa Monica, Cal.

COLORADO.

Agricultural Experiment Station,

FORT COLLINS, COL.

CONNECTICUT.

The Connecticut Agricultural Experiment Station,

NEW HAVEN, CONN.

Storrs Agricultural Experiment Station,

STORRS, CONN.

DELAWARE.

The Delaware College Agricultural Experiment Station,

NEWARK, DEL.

FLORIDA.

Agricultural Experiment Station of Florida,

LAKE CITY, FLA.

GEORGIA.

Georgia Experiment Station,

EXPERIMENT, GA.

IDAHO.

Agricultural Experiment Station of the University of
Idaho,

MOSCOW, IDAHO.

ILLINOIS.

Agricultural Experiment Station of the University of
Illinois,

URBANA, ILL.

INDIANA.

Agricultural Experiment Station of Indiana,
LAFAYETTE, IND.

IOWA.

Iowa Agricultural Experiment Station,
AMES, IOWA.

KANSAS.

Kansas Agricultural Experiment Station,
MANHATTAN, KAN.

KENTUCKY.

Kentucky Agricultural Experiment Station,
LEXINGTON, KY.

LOUISIANA.

No. 1. Sugar Experiment Station, Audubon Park,
NEW ORLEANS, LA.
No. 2. State Experiment Station,
BATON ROUGE, LA.
No. 3. North Louisiana Experiment Station,
CALHOUN, LA.

MAINE.

Maine State College Agricultural Experiment Station,
ORONO, ME.

MARYLAND.

Maryland Agricultural Experiment Station,
COLLEGE PARK, MD.

MASSACHUSETTS.

Massachusetts State Agricultural Experiment Station,
AMHERST, MASS.
Hatch Experiment Station of the Massachusetts Agri-
cultural College,
AMHERST, MASS.

MICHIGAN.

Experiment Station of Michigan Agricultural College,
AGRICULTURAL COLLEGE, MICH.

MINNESOTA.

Agricultural Experiment Station of the University of
Minnesota,
ST. ANTHONY PARK, MINN.

MISSISSIPPI.

Mississippi Agricultural Experiment Station,
AGRICULTURAL COLLEGE, MISS.

MISSOURI.

Missouri Agricultural College Experiment Station,
COLUMBIA, MO.

MONTANA.

Montana Agricultural Experiment Station,
BOZEMAN, MON.

NEBRASKA.

Agricultural Experiment Station of Nebraska,
LINCOLN, NEB.

NEVADA.

Nevada Agricultural Experiment Station,
RENO, NEV.

NEW HAMPSHIRE.

New Hampshire College Agricultural Experiment
Station,
DURHAM, N. H.

NEW JERSEY.

New Jersey State Agricultural Experiment Station,
NEW BRUNSWICK, N. J.
New Jersey Agricultural College Experiment Station,
NEW BRUNSWICK, N. J.

NEW MEXICO.

Agricultural Experiment Station of New Mexico,
MESILLA PARK, N. M.

NEW YORK.

New York Agricultural Experiment Station,
GENEVA, N. Y.
Cornell University Agricultural Experiment Station,
ITHACA, N. Y.

NORTH CAROLINA.

North Carolina Agricultural Experiment Station,
RALEIGH, N. C.

NORTH DAKOTA.

North Dakota Agricultural Experiment Station,
FARGO, N. D.

OHIO.

Ohio Agricultural Experiment Station,
WOOSTER, O.

OKLAHOMA.

Oklahoma Agricultural Experiment Station,
STILLWATER, OKLA.

OREGON.

Oregon Experiment Station,
CORVALLIS, ORE.

PENNSYLVANIA.

The Pennsylvania State College Agricultural Experiment Station,
STATE COLLEGE, PENN.

RHODE ISLAND.

Rhode Island Agricultural Experiment Station,
KINGSTON, R. I.

SOUTH CAROLINA.

South Carolina Agricultural Experiment Station,
CLEMSON COLLEGE, S. C.

SOUTH DAKOTA.

South Dakota Agricultural Experiment Station,
BROOKINGS, S. D.

TENNESSEE.

Tennessee Agricultural Experiment Station,
KNOXVILLE, TENN.

TEXAS.

Texas Agricultural Station,
COLLEGE STATION, TEX.

UTAH.

Agricultural Experiment Station,
LOGAN, UTAH.

VERMONT.

Vermont Agricultural Experiment Station,
BURLINGTON, VT.

VIRGINIA.

Virginia Agricultural and Mechanical College Experiment Station,
BLACKSBURG, VA.

WASHINGTON.

Washington Agricultural Experiment Station,
PULLMAN, WASH.

WEST VIRGINIA.

West Virginia Agricultural Experiment Station,
MORGANTOWN, W. VA.

WISCONSIN.

Agricultural Experiment Station of the University of Wisconsin,
MADISON, WIS.

WYOMING.

Wyoming Agricultural Experiment Station,
LARAMIE, WY.

CHAPTER XVI.

RULES ADOPTED BY THE AMERICAN POMOLOGICAL ASSOCIATION FOR NAMING AND DESCRIBING FRUITS.

Rule 1.—The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

Rule 2.—The society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same when they shall occur in its discussions or reports; and also to recommend such changes for general adoption.

Rule 3.—The name of a fruit should preferably express, as far as practicable by a single word, a characteristic of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

Rule 4.—Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given precedence.

Rule 5.—To entitle a new fruit to the award or commendation of the society, it must possess (at least for the locality for which it is recommended) some valuable or desirable quality or combination of qualities in a higher degree than any previously known variety of its class and season.

Rule 6.—A variety of fruit having been once exhibited, examined, and reported upon, as a new fruit, by a committee of the society, will not thereafter be recognized as such so far as subsequent reports are concerned.

A rule governing the revision of names was authorized by the society at its meeting in Washington in September, 1891, as follows:

Prefixes, suffixes, apostrophic terminations, and secondary words, together with words whose significations are expressed in the descriptive columns of the catalogue, are eliminated from the names of fruits, save in a few cases in which they may be needful to insure the identity of a variety and in a few time-honored names.

The anglicising of foreign names is resorted to only in the interest of brevity or pronounceability.

In questionable cases, subsidiary words are retained in parentheses.

Part Two.

**ON THE
DIFFERENT KINDS OF FRUIT.**

The synonyms on all the following pages are given in parentheses.

The dates for the ripening of fruits given in this book are mostly adapted to the Northern States; they should be about three weeks earlier for the latitude of Southern Virginia, and six weeks earlier for the Gulf States.

CHAPTER XVII.

APPLES.

"THE APPLE," says Downing, "is the world-renowned fruit of temperate climates." Although less delicious than the peach or pear, it possesses, from its great hardiness, easy cultivation, productiveness, its long continuance through the whole twelve months, and its various uses, an importance not equalled by any other fruit.

Nursery Management.—The mode of raising, the seedlings or stocks, and of Budding and Grafting has been already described in Chapter III. of the first part of this work. The seedlings are treated in three different ways. They may be set out into nursery rows in the spring, when a year old, to be budded the second summer; they may be taken up and root-grafted as soon as large enough; or they may be planted into rows and grafted at any subsequent period.

The following figures exhibit the difference between good and bad planting-out. Fig. 309 represents a graft well set out, the earth packed closely around the root, which is sending out new fibres, and the leaves expanding above. In Fig. 310 the work has been carelessly done, the earth being closed around the top, but left with a cavity below. Grafts set in this way rarely grow.

Fig. 311 represents the usual form of the dibble, and Fig. 312 the appearance of the root-graft when ready to be set out.

The most favorable soils are rich, well-pulverized, and rather strong loams. If light or gravelly, there is more danger from midsummer droughts, which often prove quite destructive. Grafting the whole root entire will much lessen the difficulty.

The chief care afterward is to keep the ground constantly cultivated, and perfectly clean, which will increase the growth

during summer, and exclude mice in winter; the trees are to be trained up to one leading-stem, not trimming so closely as to make them slender; they are to be kept straight, by tying them when necessary to upright stakes; and all destructive insects must be watched and destroyed.



FIG. 309.—Root-Graft, set out well, with earth compactly pressed against its roots.

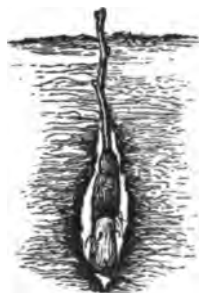


FIG. 310.—Root-Graft, badly set out, with a cavity below.

If the ground is rich and kept perfectly clean, they will grow from one and a half to two feet the first summer after grafting; to three or four feet the second summer; five to six or seven feet the third summer, when many of them will be large enough for removal to the orchard, and most of the remainder in one year more.



FIG. 311.—Dibble.



FIG. 312.—Root-Graft ready for setting.

Root-grafting is extensively performed in large nurseries; but on unsuitable soils, budding is found the most certain of success, the buds being rarely destroyed, and only by the most unfavorable winters. The bud remaining dormant the

first summer, the growth is one year later than on grafted stocks of the same age; but this difference is made up by the more rapid growth of the shoot from the bud, which is usually twice as great as that of a graft on the root. To obtain handsome and good trees, the bud should be set within two or three inches of the ground. Budded trees usually have better roots than root-grafted ones.

PLANTING ORCHARDS.

Soil.—The apple is a vigorous and hardy tree, and will grow upon most soils. It does best, however, on those that are deep, rich, and fertile, such as will give good crops of Indian corn. Hard, shallow, and wet grounds are to be avoided. Improvement by manuring and deep cultivation is desirable, as a great difference in quality and productiveness results from a difference in fertility.

Distance.—Where the quantity of ground is limited, and in rare cases, trees may for a time stand within fifteen or twenty

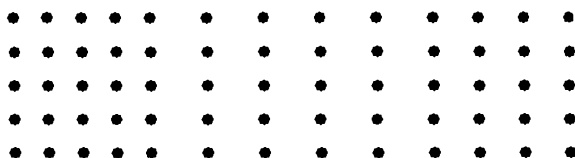


FIG. 313.—Diagram of Rows for Tree Planting.

feet; but for large and permanent orchards they should not be nearer than thirty feet. There is, however, a material difference in the size of varieties, hence a variation may be allowed. But this variation in distance should not break the rows which are to be preserved for convenience in cultivation. The rows may be kept entire, by varying the distance in one way only, as in the annexed figure (Fig. 313). The middle portion is for trees of the largest size, as the Spitzenburgh, Fall Pippin, and Rhode Island Greening; those of smallest size, as Bough, Yellow Harvest, and Sine Qua Non, are on the left; and those of middle growth, as the Swaar, Black Gilliflower, and Tallman Sweeting, are on the right.

This distinction in the size of the trees is only necessary in the most extensive orchards.

Transplanting.—Full directions have been given in a preceding chapter, where the superior advantages of broad, deep, and loose beds of earth, made by heavy subsoiling and manuring, have been pointed out; or in the absence of this excellent preparation, by digging large holes to be filled with rich mould, or manured surface-soil.

CULTIVATION.

The importance of thorough cultivation has been already noticed, and cannot be too well understood. If two specimens could be exhibited side by side, the one showing the stunted, lingering, mice-eaten, and moss-covered trees, caused by neglect; and the other, the vigorous and thrifty growth, and the fair and abundant crops, resulting from fine and clean culture,—none could fail to be satisfied of the superiority of the one and impolicy of the other.

RENOVATING AND PRUNING OLD ORCHARDS.

As soon as the first symptom of failure in old orchards appears, they should, in addition to good cultivation, be freely manured in connection with the application of lime or leached ashes. The change which may be thus wrought can hardly be understood by one who has not witnessed the result. The following experiment, similar in the nature, but differing in the mode of performance, described by H. W. Rockwell, of Utica, N. Y., cannot fail to be interesting:

“The experiment was performed upon three trees standing in my grounds, none of which were less than *thirty years* old. One of these trees, an old-fashioned [Newtown] Pippin, and a great favorite, had borne moderately; the other two made out between them to ‘get up’ about a dozen apples a year, just to let me know, I presume, that they ‘could do it,’ but were perfectly indifferent *how* it was done.

“I last summer undertook the renovation of these trees. For this purpose I opened between them trenches, say ten feet in length, two feet in depth, and about eight feet equidistant from tree to tree. The roots which were encountered in this operation were, of course, all cut off, the trenches filled with *well-rotted manure*, and closed. I finished by giving each

of the trees about a peck of charcoal mixed with the same quantity of ashes, and now for the result. I have this year gathered from the 'two outcasts' just mentioned, instead of my annual dividend of a dozen apples, from six to eight bushels apiece of as handsome fruit as you ever saw, with about the same proportion from the third, which has always been a moderate bearer."

Bearing orchards commonly lose their vigor, and give small and poor fruit, when allowed to grow in grass-land, without any cultivation. If the soil is naturally rich, a shallow ploughing and an occasional harrowing will restore their vigor. Or if ploughing cannot conveniently be given, they may be much improved by being converted to pasture for sheep, adding occasionally a top-dressing of manure in autumn. These animals will serve in part to enrich the land, keep the grass grazed short, and pick up the prematurely fallen fruit, infested with worms or insects.

The amount of cultivation or top-dressing to be given to such orchards must be determined by the annual growth of the shoots. If less than a foot in length, more vigor must be imparted to them. If more than a foot and a half, they are quite thrifty enough.

Pruning.—The mode of treating large trees has been already adverted to in the chapter on pruning. There are some owners of orchards who most erroneously suppose that when trees become old, heavy pruning will restore their vigor in the absence of good cultivation; while the correct mode of treatment is very moderate and gradual pruning, in connection with the best of cultivation. The foregoing correct portraits of actually existing specimens of bad pruning unhappily have too many originals over the country



FIG. 314.—Illustration of Bad Pruning of Old Tree.

(Fig. 314). This most unsightly mode of trimming is often adopted when a removal of the top by grafting is intended.

Grafting New Tops on Old Trees.—It often happens that fruit on large trees is worthless, and it becomes an important object to change the top by grafting or budding it with some better variety. In this case, instead of cutting off large branches and grafting them at once, it is better to prune the top in part, as shown by Fig. 315, which will cause an emission of vigorous shoots. These are then budded or grafted with ease and success. And, as the grafts gradually extend by growth, the remainder of the top may, by successive excisions, be entirely removed. Where trees are not too old, and the ground is kept cultivated, good-sized trees are thus obtained much sooner than by setting out young ones.



FIG. 315.—Proper Pruning to form New Heads on Old Trees.

To give a well-shaped head to such newly formed trees, and to prevent the branches from shooting upward in a close body near the centre of the tree, the old horizontal boughs should be allowed to extend to a distance in each direction, while the upright ones should be lopped. This is distinctly exhibited in Fig. 315.

The following judicious mode of renewing the old tops of trees formerly regarded as worthless, was given by the late George Olmsted, of Hartford, Conn., in the *Horticulturist*:

"These trees I commenced grafting six years ago last spring. I began on the top, and grafted one-third of the tree each year. It therefore required three years to complete the entire heads of the trees.

"I like this method better than any I have ever tried for grafting large trees, as it gives the grafts a good opportunity to get well started. Cutting off and grafting the top first gives the grafts there the best possible chance, while the necessary reduction of the top throws the sap into the remaining side-branches, which fits them well for grafting the following year; and the third year, the lowest branches being

made ready in the same way, may be grafted successfully. By this mode, it will be seen that when the grafts are put in the side-branches, they are not shaded by the heavy shoots above them, and they have an unusual supply of nourishment to carry them forward. Those who have attempted to graft the whole head of a large tree at once are best aware of the great difficulty in the common mode of getting the grafts to take on the *side-limbs*.

"One of these large trees so treated is probably more than seventy-five years old, and has now an entirely new and vigorous head, grafted with this excellent variety. When I began with it, the fruit was only fit for cider, and it was questionable whether the tree should not be cut down. By grafting it in this manner, I have added surprisingly to its value. Two years ago (the bearing year), I obtained from it ten bushels of apples; last year eight bushels; and this year (only six years from the time I began to graft it), I gathered twenty-eight and a half bushels of excellent fruit!

"I consider this tree now worth one hundred dollars; the cost of grafting it was about five dollars; and the latter was all repaid two years ago—the first season the grafts bore fruit."

The bearing year of apple-trees which yield excessive crops is only every alternate year; but by thinning out a large portion of the fruit while yet small, the exhaustion will not be so great as to render the tree barren the second season, and it will bear annually. By picking off all the young fruit, the bearing year may be entirely changed, or one bough may be made to bear one year, and another bough the second year.

Depredators.—The insect enemies of the apple have been already described. Mice, which sometimes girdle and destroy young trees, especially such as are neglected and allowed to grow in grass, may be excluded by a small mound of earth, thrown up about ten inches high around the stems late in autumn. This earth should be compact and smooth, and not consist of turf, which is liable to cavities, instead of repelling these depredators. Fig. 316 shows the mode of performing this operation. If well



FIG. 316.—Mode of Banking up Trees to Protect from Mice.



done, it has never failed to protect the trees. One man will go over some hundreds in a day. In the following spring this earth is again levelled.

Rabbits are excluded by tying woven wire netting or stiff painted paper around the stems eighteen inches high, or, easier, by rubbing fresh blood upon the bark every few weeks during winter, which may be done by using a piece of fresh liver for this purpose.

CHANGES WROUGHT BY CLIMATE AND SOIL.

This subject has been treated, as applied to fruits generally, in a former part of this work; a few brief remarks on the variations in the apple may be interesting.

The winter apples of the Northern States, when cultivated farther south, are changed to autumn apples; and as far south as Georgia, some of our good keepers ripen nearly by the end of summer. The Baldwin and Rhode Island Greening, at Cincinnati and at St. Louis, cease to be winter fruits. There are few or none of the northern apples will succeed well as keepers as far south as Carolina. This is owing to the long southern summers. It has been found that varieties originated in the Southern States are generally best adapted to the climate of that region.

Some varieties are greatly influenced by a change of climate, and others but slightly. The Ribston Pippin, so excellent at Montreal, is of little value a few degrees further south. The Rhode Island Greening and the Roxbury Russet, on suitable soils, throughout New York and New England, present the same characteristics of flavor and appearance; the Baldwin, so fine at the east, greatly deteriorates in northern Ohio; and the Belmont, which has been pronounced the most valuable of all apples at Cleveland, is unworthy of cultivation at Cincinnati. These changes, in the latter instances, may perhaps be ascribed to a difference in soil; and the application of special manures, as lime, potash, etc., on those unfavorable soils, has improved the quality. The periods of ripening, given in the following pages, are intended to apply to the Northern States. A difference of about two or three weeks exists between fruits cultivated at Boston or Rochester, and

in central Ohio and southern Pennsylvania, and other differences of latitude nearly in the same ratio.

DWARF APPLES.

For summer and autumn sorts, dwarf apples are valuable in affording a supply to families. They begin to bear in two or three years from setting out, and at five or six years, if well cultivated, will afford a bushel or so to each tree. A portion of a garden as large as the tenth of an acre may be planted with forty or fifty trees, without crowding. All the different varieties of the apple may be made Dwarfs by working on the Paradise or Doucin stock—the former are smaller and bear soonest; the latter are large and ultimately afford the heaviest crops. Among the handsomest growers as dwarfs are Red Astrachan, Jersey Sweet, Porter, Baldwin, Dyer, Summer Rose, Benoni, and Sweet Bough.

THE AGE AT WHICH APPLE-TREES BEGIN TO FRUIT.

To those who wish fruit at the earliest time after setting out trees, the following results of observations at the New York General Agricultural Experiment Station is of interest and value. Probably most trees obtained from nurseries are two to three years old, and the time of fruiting after this will no doubt vary somewhat with the location, soil, and cultivation given them. The list is by no means complete, and from it are here quoted only those in general cultivation:

Baldwin	8 years
Ben Davis	4 "
Carolina June	4 "
Cooper's Market	5 "
Dominie	5 "
Oldenburg	2 "
Early Harvest	4 "
Early Strawberry had not fruited at	9 "
Esopus Spitzenburgh	9 "
Fallawater	5 "
Fall Pippin	9 "
Fameuse	5 "
Gideon	4 "

Golden Russet	9 years
Golden Sweet	9 "
Gravenstein	8 "
Green Newtown Pippin	5 "
Haas	2 "
Jefferis	4 "
Jersey Sweeting	4 "
Keswick	3 "
King, Tompkins County. . . .	5 "
Lady Sweet	9 "
Longfield	4 "
Maiden's Blush	4 "
McMahon's White	4 "
Melon	4 "
Monmouth	5 "
Mother	9 "
Munson's Sweet	5 "
Northern Spy	9 "
Peck's Pleasant	7 "
Pewaukee	5 "
Pomme Grise	5 "
Primate	3 "
Pumpkin Russet	9 "
Pumpkin Sweet	9 "
Rambo had not fruited at	9 "
Rawle's Janet	5 "
Red Astrachan	5 "
Red Beitigheimer	8 "
Red Russet	9 "
Rhode Island Greening	5 "
Rome Beauty	2 "
Sops of Wine	5 "
Stump	7 "
Sutton's Russet	9 "
Tallman's Sweet	8 "
Tetofsky	4 "
Twenty Ounce. . . .	5 "
Vandevere	5 "
Wagener	4 "
Westfield Seek-no-further	9 "

William's Favorite	3 years
Winesap	5 "
Yellow Bellflower	9 "
Yellow Transparent	4 "

VARIETIES.

SYNOPSIS OF ARRANGEMENT.

Division I. SUMMER APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division II. AUTUMN APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division III. WINTER APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division IV. CRAB APPLES.

The characteristics which constitute these divisions and subdivisions are not in all cases perfectly distinct. Summer apples gradually pass into autumn, and autumn into winter apples. A few, but the number is extremely small, possess nearly a neutral flavor between a dead sweetness and slight acidity. Again, apples classed with those that are striped

sometimes present a nearly uniform shade of red; and in rare instances, the brown cheek of a green or yellow variety exhibits faint stripes.

But these may be regarded rather as exceptions to general characters, which are on the whole as clearly defined as any other distinctive points of the different varieties. Controlling circumstances will produce changes in all fruits, and descriptions are not founded on extreme exceptions, but on *average* characteristics.

The *SIZE* is designated by comparison;—for example, the Swaar and Baldwin are *large*; Herefordshire Pearmain and Tallman Sweeting are *medium*; English Golden Pippin and Lady Apple are *small*. Qualifying terms give a more precise meaning—as the Fall Pippin and Monstrous Pippin are *very large*; Hawley and Dutch Mignonne are *quite large*; Bullock's Pippin and Early Strawberry are *rather small*; and the Siberian Crab is *very small*.

The illustrations in this chapter are all taken from average sized specimens of the fruit, and uniformly reduced in size one-half. The more valuable varieties are indicated by an asterisk, thus *.

DIVISION I.—SUMMER APPLES.

CLASS I.—SWEET APPLES.

Section I.—Striped with red.

Beautiful Arcad.* Medium, oblong, truncated, angular; white, yellow splashed with crimson on side. A marked characteristic is the roughened surface; cavity slightly abrupt, slightly wavy, stem very short; basin wide, corrugated; flesh yellow, firm, fine-grained, sweet, and rich; best quality. Summer. Fig. 324. Russian.

Foster. Large, roundish; indistinctly striped, pale red on yellow; stalk short, calyx open; basin deep, ribbed, sweet, rich. August. Massachusetts.

Sweet Borovinka.* Medium, roundish, oblate; yellow, striped, and splashed with red; cavity acute; stem short; basin wide, shallow, corrugated; flesh white, firm, juicy, very sweet, quality good. Summer. Fig. 321. Russian.

Section II.—Not striped.

Golden Sweet.* Medium or rather large, roundish, slightly flattened; greenish, becoming pale yellow; stalk an inch or more long, slender; cavity acuminate; basin moderate; flesh very sweet, good, of moderate quality. The fruit is always fair, the tree a free grower, and very productive. Buds large; leaves sharply serrate. Late in summer. Valuable for domestic animals. Tender far west; succeeds well southwest. Fig. 325.

Hightop Sweet.* (Summer Sweet of Ohio, Sweet June.) Rather small, roundish, regular; skin smooth, light yellow; cavity deep, narrow; calyx small, in a shallow, slightly furrowed basin; flesh yellowish, very sweet, rich; tree upright, productive. A valuable summer sweet apple at the West. Fig. 319.

FIG. 317.—Sweet Bough.

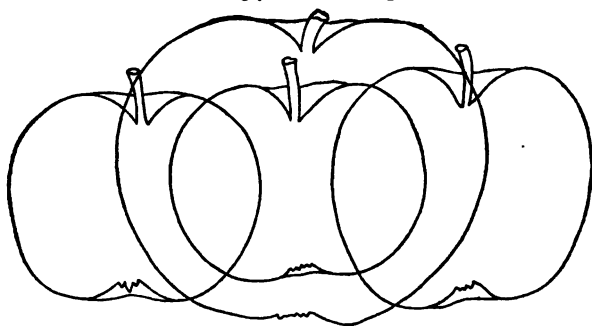


FIG. 319. Hightop Sweeting. FIG. 320. Early Harvest. FIG. 318. American Summer Pearmain.

Manomet. (Manomet Sweeting.) Size medium, roundish; yellow, with a rich cheek; stalk rather slender, cavity shallow; basin shallow, furrowed; flesh tender, sweet, rich. Late summer. Massachusetts.

Sweet Bough.* (Large Yellow Bough, Early Sweet Bough.) Large, roundish, remotely conical-ovate, sometimes distinctly conical; pale greenish yellow stalk; one-half to an inch long; basin narrow, deep; flesh white, very tender, with an excellent sweet flavor. Ripens from the middle to the end of summer. A moderate and regular bearer. Shoots yellowish, somewhat irregular, ascending; tree round-headed; leaves obtusely crenate. Fig. 317.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section I.—Striped with red.

American Summer Pearmain.* (Early Summer Pearmain, of Cox.) Medium in size, oblong, slightly inclining to truncate-conical; nearly covered with fine broken streaks and dots of red; stalk

nearly one inch long; basin round, even, distinct; very tender, often bursts in falling; sub-acid, flavor fine. Continues to ripen for several weeks in late summer and early autumn. Needs good and rich cultivation. Growth rather slow. This is distinct from the English Summer or Autumn Pearmain, in its larger size, higher red, more oblong form, and superior quality. Fig. 318.

Aromatic Carolina. Large, oblate-conic, oblique; pale red with heavy bloom; flesh tender and melting, flavor aromatic and excellent. July. Tree spreading. An abundant bearer. Southern.

Benoni.* Medium in size, roundish, sometimes obscurely conical; deep red on rich yellow, in distinct broken stripes and dots; stalk half an inch long; basin small; flesh yellow, tender, rich; sub-acid, "very good." Late summer. Tree erect, good bearer. Has not succeeded well in all localities. A native of Dedham, Massachusetts. Fig. 331.

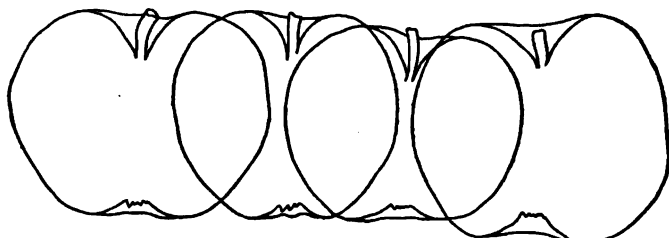


FIG. 321. Sweet Borovinka. FIG. 322. Sweet Pepka. FIG. 323. Smoky Arcad. FIG. 324. Beautiful Arcad.

Carolina Red June.* (Red June, Blush June.) Size medium, oblong, very red; flesh white, tender, juicy, sub-acid, with a sprightly, agreeable flavor; quite early, and continues to ripen for four weeks, and will keep long after ripe for a summer apple; profitable for market. The tree a fine erect grower, very hardy, bears young and abundantly. The most valuable early apple in northern Illinois and adjacent region. Hardy at the West. Fig. 327.

Carolina Watson. Large, greenish yellow, red, striped; flesh white, tender, sub-acid; tree vigorous. Alabama. Summer.

Early Joe.* Size medium or rather small; oblate, sometimes obscurely approaching conical; smooth and regular; color, with numerous short, broken, red stripes on yellow ground, a nearly uniform deep red to the sun, with conspicuous white specks; stem three-fourths of an inch long, rather thick; cavity shallow, acute; basin small, even; flesh fine grained, very tender, slightly crisp, juicy, sub-acid, spicy, quality "best." Ripens the last two weeks of summer. Shoots dark, growth slow. A profuse bearer. Fig. 329. Origin, East Bloomfield, N. Y.

Early Norfolk. Medium, oblate; yellow striped and blotched red; flesh white, sub-acid. Said to bear transportation well. July. Virginia.

Early Pennock. Fruit large, roundish, conical; striped bright red on greenish yellow; stem long; cavity deep; irregular; flesh yellowish white, rather coarse, sub-acid, of rather poor quality. Esteemed at the West for its hardiness and productiveness. August and September.

Early Red Margaret. Rather small, round-ovate; striped with dull red, somewhat russeted; stalk half an inch long, thick; basin plaited, narrow, very shallow; flesh sub-acid, tender, good when fresh; ripens at wheat harvest, scarcely earlier than Early Harvest. Shoots erect, downy; moderate bearer.

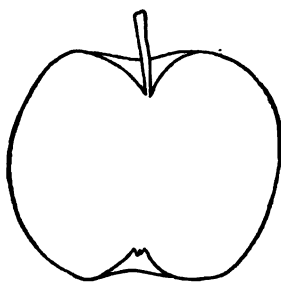


FIG. 325.—Golden Sweet.

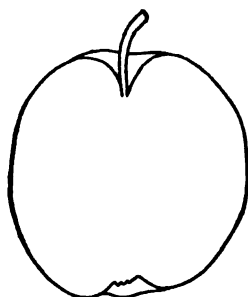


FIG. 327.—Carolina Red June.

Early Strawberry.* (American Red Juneating, of *Manning*.) Rather small, roundish, varying to round-ovate, and sometimes quite conical; surface indistinctly and finely striped with bright and deep red, tinging faintly the flesh; stalk slender, three-quarters to an inch and a half long; basin small and narrow; flesh white, tender, sub-acid, rather brisk, pleasant, not very rich. Ripens one to three weeks later than Yellow Harvest. Growth, very erect; leaves erect, finely crenate. Productive. Good in all localities. Fig. 328.

Fourth of July. Above medium, roundish oblate, often slightly conic; striped red on pale yellow, with a white bloom; flesh yellowish, tender, rather acid, of moderate quality; ripens very early, productive. Valuable for cooking and profitable for market. Cultivated at the West. Of foreign origin.

Foundling. Rather large, oblate-conic, ribbed; striped red on yellowish green; stalk short, slender, cavity large, basin small, furrowed; flesh yellow, tender, with a rich, sub-acid flavor. Massachusetts.

Garden Royal. Below medium, roundish, slightly flattened at ends, even and regular; surface with small, broken, red stripes on yellow ground, deep red to the sun; stalk short, or half to three-

fourths of an inch long, slender, cavity acute; calyx large, open; basin very shallow; flesh yellowish white, exceedingly tender, and fine-grained; flavor mild, sub-acid, fine. A poor grower, but a first-rate dessert fruit. Late summer. Origin, Sudbury, Mass.

Hocking. (Townsend.) Rather large; striped red on yellow; cavity wide; basin shallow, slightly ribbed; flesh fine-grained, tender, mild sub-acid. August. An upright, vigorous, productive tree. Valued at the West.

Julian. (Julin.) Fruit medium, roundish, conical; calyx small in a narrow basin, stem short in a moderate cavity; striped with fine red on yellowish white; flesh white, tender, and fine flavored. One of the finest summer apples at the South, where it ripens at midsummer.

FIG. 328.—Early Strawberry.

FIG. 331.—Benoni.

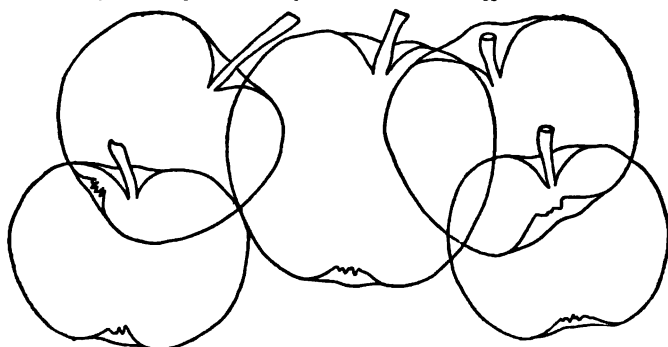


FIG. 329.
Early Joe.

FIG. 330.
William's Favorite.

FIG. 332.
Summer Rose.

Klaproth. Size medium, oblate; streaked and stained with red on greenish yellow; stalk short, cavity deep; basin wide, even; flesh white, crisp, with a pleasant sub-acid flavor. Tree a strong grower and great bearer. Fruit bears carriage well. A good market sort. Lancaster County, Pa. August to October.

Raspberry. (*Red Cheek.*) Small, oblong truncated; yellow, covered rosy red; cavity narrow; basin wide, almost flat; flesh white stained with red; sub-acid, juicy, sprightly, best. Resembles Red June. Tree hardy and healthy. Russian. Fig. 361.

Sops of Wine.* Medium size, round-ovate, dark red; stalk long, slender; flesh white, often stained red, moderately juicy, sub-acid, of good flavor. Valuable for its free growth and fair fruit. Late summer. The *Sapson* is smaller, firmer in flesh, and less valuable. Fig. 359.

Summer Hagloe. Size medium, roundish-oblate; streaked with bright red on yellow ground; stalk rather short and thick; flesh very soft, rich, of fine quality. Ripens at the end of summer. An excellent culinary variety. Shoots dark, strong, thick; terminal buds very large.

This is wholly distinct from the *Hagloe Crab*, a late, small, ill-shaped, ovate fruit, cultivated only for cider.

Summer Queen. Rather large, roundish-conical, somewhat ribbed; striped with bright red on rich yellow ground; stalk an inch and a half long; cavity small, acute; basin small, furrowed; flesh yellowish, rather acid, spicy, very rich. Fine for cooking. Late summer. Good on warm, sandy soils, poor on cold clay. Shoots light colored, leaves finely crenate. Hardy far West.

Summer Rose.* (Woolman's Early, Lippincott's Early, Woolman's Striped Harvest.) Medium or rather small, roundish-oblate; yellowish, blotched, and streaked with red; stalk rather short; basin round, slightly plaited; flesh very tender, slightly crisp, texture fine, mild sub-acid, juicy, excellent. Begins to ripen with wheat harvest, and continues a month. Better in quality for the table than Early Harvest, but less productive, and too small for general value. Fig. 332.

Williams' Favorite.* (Williams, Williams' Red, Williams' Favorite Red.) Size medium, sometimes rather large; oblong-ovate, remotely conical, very smooth; color mostly fine dark crimson stripes; stalk three-quarters to one inch long, enlarged at insertion, cavity shallow; basin small and shallow, even, or somewhat ribbed; flesh yellowish white, moderately juicy, with sometimes a tinge of red near the surface, mild, agreeable, fine. Ripens for several weeks late in summer. Its handsome appearance has partly contributed to its high reputation. Requires a rich soil and good cultivation. Fig. 330. Origin, Roxbury, Mass.

Section II.—Not striped.

Cole's Quince. Large, oblate, conical, ribbed; yellow; mellow when ripe, mild, rich, high quince flavor. Cooks well before ripe. Productive. New England. Hardy far west.

Early Harvest.* (Yellow Harvest, Prince's Harvest, Early French Reinette, July Pippin.) Size medium, roundish, usually more or less oblate, smooth; bright straw color when ripe; stalk rather short and slender; calyx moderately sunk; flesh nearly white, flavor rather acid, fine. Ripens at wheat harvest, and for three weeks afterward. Shoots erect, slightly diverging, straight, often forked. Productive. Needs rich cultivation to be fine. Good throughout the northern States and southwest, tender northwest. Fig. 320.

Garretson's Early. Size medium, roundish-oblate; skin greenish yellow with numerous dots; stalk short, cavity shallow; basin small, furrowed; flesh white, crisp, tender, sub-acid, "very good." July and August. Tree vigorous, productive.

Horse. Large, varying from oblate to oval, ribbed; yellow; stalk short; cavity and basin shallow; flesh yellow, rather coarse, sub-acid. Tree vigorous, productive, valued at the South and West as a summer cooking and drying apple.

Kirkbridge White. (Yellow June.) Size medium, oval, tapering to apex and base, equally blunt at ends with broad ribs, smooth; pale yellow; stem short; cavity and basin very narrow; flesh very tender, fine-grained, with a moderately "good" sub-acid flavor. Ripens soon after Early Harvest and for six weeks. Tree a slow grower, but a great and early bearer; valuable at the West. Too tender for long transportation.

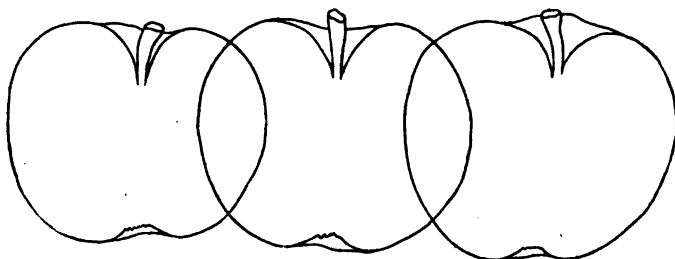


FIG. 333.
Primate.

FIG. 334.
Red Astrachan.

FIG. 335.
Starr.

Liveland Raspberry.* Medium, roundish, conic, clear; waxen, white, shaded and marbled crimson; cavity narrow, acute; stem medium; basin small; flesh snow-white, tinged with pink next the skin; tender, fine-grained, crisp, juicy, sub-acid, almost sweet, quality best. Fig. 364. August. Russian.

The beauty of this apple will attract attention everywhere.

Lyman's Large Summer. Large, roundish, flattened at ends; pale yellow; sub-acid, high flavored, rather fine in quality. Ripens at the end of summer. Tree a poor bearer until large. Connecticut.

Primate.* Above medium in size, roundish-conical, somewhat ribbed; light green, becoming light yellow, often with a slight blush; fine grained, very juicy, with a very agreeable, mild, sub-acid flavor. Ripens for several weeks through the latter part of summer. Valuable. Western New York. Fig. 333.

Red Astrachan.* Rather large, sometimes quite large, roundish-oblate, slightly approaching conical, rather smooth; nearly whole surface brilliant deep crimson, with a thick bloom like a plum; stalk one-half to three-fourths of an inch long; calyx in a small slightly uneven basin; flesh white, rather crisp; good, rather acid, slightly austere. A few days after Early Harvest. Excellent for cooking. Shoots stout, dark brown, diverging and ascending; leaves broad. This apple, although of second-rate flavor, is rendered by its earliness and very handsome and

fair appearance, by the vigor and productiveness of the tree, and its excellent culinary qualities, worthy of general cultivation. It should be picked a few days before fully mature. Hardy far West. Fig. 334.

Sine Qua Non. Size medium, roundish, inclining to conical; smooth, pale greenish yellow, shaded with reddish brown to the sun; stalk quite slender, nearly an inch long; basin smooth or very slightly plaited; flesh greenish white, fine grained, delicate, very tender, moderately juicy, of a fine, agreeable, sub-acid flavor. Shoots greenish yellow, growth slow. Ripens two weeks after Early Harvest. Origin, Long Island.

Starr. Large, roundish oblate, regular, smooth; pale green, often with blush on sunny side; flesh yellowish, firm, sub-acid, good. Summer. New Jersey. Fig. 335.

FIG. 336.—Broadwell.

FIG. 337.—Munson's Sweet.

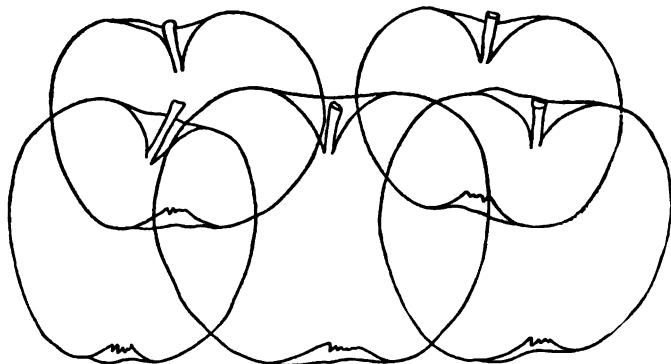


FIG. 338.—Porter.

FIG. 339.—Hawley.

FIG. 340.—Pomeroy.

Summer Pippin. (Soft Bough.) Rather large, oblong, oval, irregular; skin pale yellow, with greenish dots and a crimson blush; stalk variable, deep set; basin abrupt, furrowed; flesh white, tender, with a pleasant sub-acid flavor. End of summer. A regular, handsome grower and good bearer. Westchester County, N. Y.

Trenton Early. Size medium, roundish-oblate, ribbed; color yellowish, somewhat marked with green; surface smooth, cavity wide, basin furrowed; flesh light, tender, with a pleasant sub-acid flavor. Late summer. Valued at the West.

White Juneating. Small, round, sometimes slightly oblate, smooth, very regular; pale greenish yellow, or light yellow; very thin russet round the stalk; stalk slender, three-quarters of an inch long, set shallow; basin very shallow; tender, sub-acid, not rich, becoming dry. Ripens a little before Yellow Harvest. Growth upright, rather stout. Productive. For cooking only. Old English sort.

The **May apple**, of Virginia, is a fruit similar to or identical in character and quality with the **White Juneating**, where it ripens about the first of summer, bearing every year. Large quantities are sent to Baltimore for tarts.

Warfield. Medium, very round; fair, with a light blush; tender, pleasant acid; may be used for cooking in July when two-thirds grown. An excellent late summer market apple. Origin, Muscatine, Ia.

DIVISION II.—AUTUMN APPLES.

CLASS I.—SWEET APPLES.

Section I.—Striped with red.

Jersey Sweeting.* Size medium, round ovate, often oblong-ovate, somewhat conical; thickly striped with fine red on greenish yellow; stalk one-half to an inch long; cavity rather irregular; basin wrinkled, distinct; flesh whitish, very sweet, juicy and tender, good flavor. Succeeds well in most localities. Early and mid-autumn—immediately follows Golden Sweet. Shoots stout, short jointed; leaves crenate-serrate. Fig. 343.

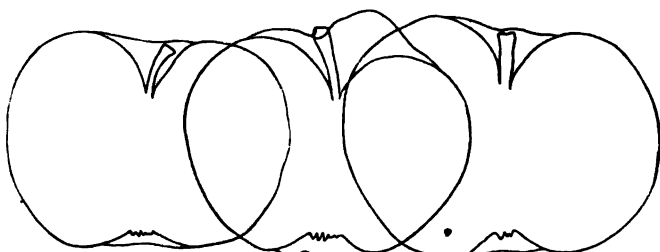


FIG. 341.
Rambo.

FIG. 342.
Prolific Sweeting.

FIG. 343.
Jersey Sweet.

Richmond. Large, roundish-oblate, slightly ribbed; splashed and striped with crimson on yellow ground, with numerous dots; stalk short, cavity large; calyx large, open; basin large, furrowed; flesh white, tender, sweet, rich. Late autumn. Origin, Sandusky, O.

Section II.—Not striped.

Autumnal Swaar. (Sweet Swaar.) Large, oblate, sometimes very slightly ribbed; rich yellow; stalk an inch or more long, varying from long and slender, to thick and fleshy at insertion; cavity and basin wide and slightly ribbed; flesh tender, yellowish, not juicy, with a very sweet, spicy, agreeable flavor. Mid-

autumn. Growth vigorous, shoots diverging, tree spreading. A large, roundish-conical apple, with a good, mild, sub-acid flavor; is grown under this name at the West.

Autumn Sweet Bough. (Autumn Bough, Fall Bough, Late Bough, Philadelphia Sweet.) Size medium, conical, angular; pale yellow; stalk slender, deep set; basin deep, furrowed; flesh white, tender, with a very good flavor. Early autumn. Tree vigorous and productive.

Haskell Sweet. Large, oblate, regular; greenish, a warm brown cheek; stalk one-half to three-fourths of an inch long, moderately sunk; basin rather deep, nearly even, flesh tinged with yellowish brown, very tender, sweet, good.

Lyman's Pumpkin Sweet. Very large, roundish, ribbed most toward the stalk; pale green; stalk short; calyx small, basin abrupt; flesh white, sweet, tender, not juicy, of moderate quality. Ripens through autumn, into winter. A valuable culinary sort.

Munson Sweet.* Size medium, oblate, smooth, and regular; pale yellow, with a brown blush; stalk short, in a broad cavity; calyx in small basin; flesh yellowish white, tender, with a very good, sweet flavor. Tree a strong grower and uniform bearer. Last half of autumn. A valuable sweet apple. Fig. 337.

Prolific Sweeting. Medium, oblate conical, base and apex very irregular; smooth yellowish white, lined green; flesh white, firm, juicy, sweet, with clear water spots. Good. September in Vermont. Fig. 342. Russian.

Pumpkin Russet. (Sweet Russet.) Large, round, slightly flattened; yellowish green, partly russeted; cavity wide, shallow; basin small; flavor rich and sweet. Through autumn. Distinct from the Sweet Russet cultivated through western New York, which is a more conical fruit.

Smoky Arcad.* Small, medium, roundish-oblate, greenish yellow, cavity narrow, acute, stem short; basin small, abrupt, regular; flesh white, firm, sweet, quality very good. Fig. 323. Russian.

Summer Sweet Paradise. Large, roundish, sometimes remotely oblong, and slightly flattened at the ends, regular; pale green; stalk rather thick, three-quarters of an inch long; basin large, distinct; flesh tender, sweet, rich, aromatic. Ripens first of autumn. Shoots spreading, leaves sharply serrate. Origin, Pennsylvania.

This is totally distinct from the Dwarf Paradise, used for stocks, which bears a small, poor, sweet, summer fruit.

Sweet Longfield.* Large, regular, oblong-conic; truncated greenish yellow, usually blushed on sunny side; cavity regular, acute; stem medium; basin small and abrupt; flesh white, fine-grained, rich, very sweet, quality very good. Late autumn. Fig. 348. Russian.

Sweet Pepka.* Small, oblong-conic, angular; yellowish white; cavity regular, narrow; stem short; basin wide, shallow, wrinkled; flesh white, juicy, fine-grained, sweet, quality very good. Autumn. Fig. 322. Russian.

Tift Sweeting. Medium in size, flat; greenish yellow, with russet network, and a warm, light brown cheek; stalk one inch long; cavity wide, obtuse; flesh yellowish, rich, sweet, fine in favor. A light bearer. New England.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section I.—Striped with red.

Alexander. Very large, conical, flattened at base, regular; streaked with bright red on greenish yellow; stalk small, cavity rather deep; calyx large, basin deep, even; flesh rather crisp, sub-acid; a coarse sort, only for cooking. A moderate or poor bearer. Late autumn. Very showy, its only recommendation. Russian.

Beauty of Kent. Very large, roundish, somewhat flattish-conical, fair, smooth, and rather obtuse; nearly the whole surface striped with rich purplish red; stalk three-fourths to an inch and a half long, slender; cavity acuminate; calyx small, basin deep, narrow; flesh tender, slightly sub-acid, of rather poor flavor. One of the most beautiful and magnificent in appearance of all apples, but of little or no value, except for cooking. Late autumn. Growth strong and upright, shoots dark. English.

Bonum. Large, oblate; red; basin cavity shallow; stem medial length; flesh yellow, sub-acid, rich, delicious. An early and abundant bearer. North Carolina.

Buckingham.* (Bachelor, Equinetely, Fall Queen of Kentucky, Kentucky Queen.) Medium to large, oblate, inclining to conic; striped, shaded and splashed with crimson on greenish yellow, with many light brown dots; cavity large; stalk short; basin wide and deep, somewhat furrowed; flesh yellowish, tender, breaking, mild sub-acid, very good in quality. Late autumn and early winter. A popular and profitable sort in the southwestern States. Tree hardy and healthy, and moderately productive, forming a round-headed top. Fig. 350.

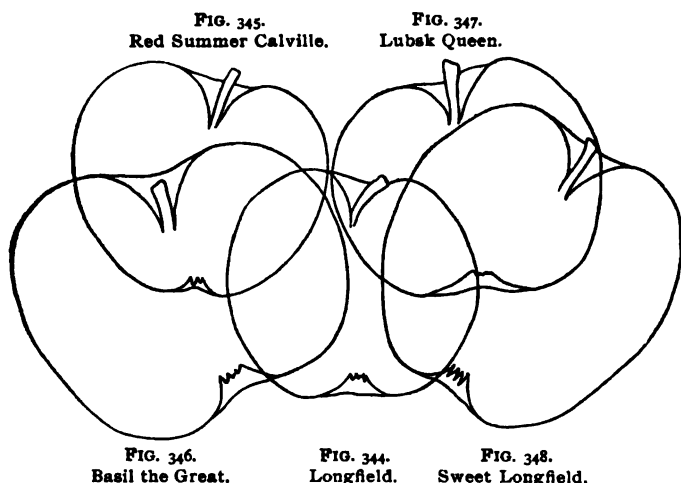
Carnation. W. N. White, of Georgia, gives the following description of this apple: Medium size; a delicious, sub-acid apple, fully first rate; dark red, splashed with russet; flesh white, brittle, and very juicy; both stalk and calyx are sunk in deep depressions; no autumn apple is superior. Ripe August 10th.

Chenango Strawberry. (Frank, Buckley, Jackson, Sherwood's Favorite, Strawberry.) Rather large, oblong-conic, angular; striped and splashed with light crimson on whitish yellow ground; cavity narrow and deep; basin narrow; flesh white, very tender, with a pleasant, mild, sub-acid flavor. September. October. Growth upright, vigorous, shoots light colored. Origin, Chenango Co. N. Y.

Clyde Beauty. Large, roundish-conical, slightly ribbed; striped and mottled red on greenish yellow; stem short, slender, deep set; basin furrowed; flesh white, fine-grained, sub-acid. Late autumn. Wayne County, N. Y.

Cooper. Rather large, round oblate, sides unequal; greenish yellow and pale red; stalk slender, deep set; basin deep; flesh crisp, juicy, pleasant, but not very high flavor. Mid-autumn. Cultivated in Central Ohio.

Cornell's Fancy. Rather large, oblong conic; shaded and splashed red on yellow; stalk medium, cavity large; basin abrupt, furrowed; flesh white, tender, with a pleasant sub-acid flavor. September. Cultivated and valued in central Pennsylvania.



Doctor. (De Witt.) Medium in size, or large; regular, oblate; yellow, clouded and streaked with red; stalk and calyx deep set; flesh breaking, tender, aromatic, brisk, fine flavor. Late autumn and early winter. Succeeds well in Pennsylvania and Ohio; less esteemed farther north. Origin, Pennsylvania.

Fairbanks. Size medium, rather oblate, inclining to conic; skin light yellow, striped with red, with patches of russet; stem long, set in a broad and shallow cavity; flesh yellowish, juicy, with a rich sub-acid and vinous flavor. September and October. Origin, Winthrop, Me.

Fall Seek-no-further. Very large, oblate; shaded and striped with red on yellow; stalk long; cavity large, russeted; basin broad, uneven; flesh whitish, tender, pleasant, sub-acid. Productive. Connecticut.

Fall Wine.* Medium to large, roundish-oblate; color a rich red, faintly striped on a rich yellow skin; stem slender; flesh yellow, crisp, tender, juicy, with a mild, rich, scarcely sub-acid flavor. Mid-autumn till winter. Fig. 349. Succeeds best in the West—often scabby at the East.

Fameuse. (Snow-apple, Pomme de Neige.) Medium in size, round, often oblate, even; handsomely striped and blotched with fine deep red on whitish ground—where much exposed, a deep, nearly uniform red; stalk three-fourths of an inch long, slender; cavity small; basin quite small, slightly wrinkled; flesh very white, juicy, sub-acid, a little spicy, exceedingly pleasant, but not very rich. Late autumn. Shoots dark, diverging, somewhat flexuous. Much admired as a table fruit for its handsome appearance and pleasant, refreshing flavor. Fig. 355.

Gabriel. Size medium, roundish-ovate, regular; striped and splashed with pale red on yellow; stalk slender; calyx and basin small; flesh yellowish, sub-acid, of excellent flavor.

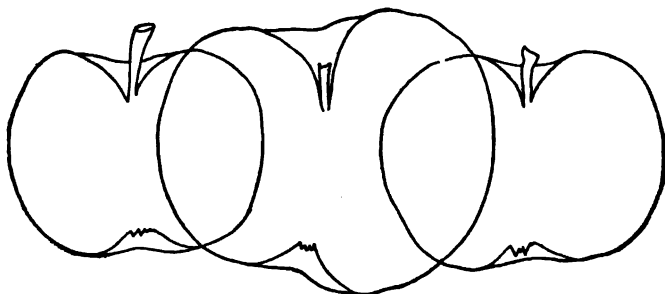


FIG. 349.
Fall Wine.

FIG. 350.
Buckingham.

FIG. 351.
Soulard.

Gravenstein.* Rather large, roundish, slightly oblate, obtusely and obscurely ribbed, surface a little wavy; striped and splashed with bright red on a yellow ground; stalk three-quarters of an inch long; cavity rather deep; calyx large; basin deep, narrow; flesh tender, juicy, very rich, sub-acid or rather acid, high flavored. Mid-autumn. Productive, handsome, and excellent. Fine in all localities. Shoots strong, becoming smooth and shining, ascending. Fig. 358. German.

Hurlbut. Size medium, oblate, conic; yellow striped with red; stalk small; cavity large; basin shallow; flesh white, crisp, tender, with a mild sub-acid flavor. Connecticut.

Jefferson County. Medium, roundish, regular; striped and shaded red on yellow; cavity deep; calyx small; basin deep, smooth; flesh crisp, tender, with a very good mild sub-acid flavor. Late autumn. Tree vigorous, productive. Jefferson County, N. Y.

Jefferis. Medium or rather large, round oblate; yellow, red, and deep red, striped; stalk very short, slender; cavity and basin

deep; flesh yellowish white, remarkably tender and juicy; flavor very pleasant. Ripens first of autumn. Fig. 357. Origin, West-Chester, Pa. Hardy far north.

Jewett's Red. (Jewett's Fine Red, Nodhead.) Medium or rather large, roundish, slightly oblate; striped red on yellow or slightly greenish yellow ground, with conspicuous white dots; stem nearly an inch long; cavity acuminate; basin rather shallow; flesh remarkably tender, fine grained, mild sub-acid, slightly aromatic. Mid-autumn into winter. Cultivated in the northern parts of New England. Hardy at the West.

FIG. 353.—Late Strawberry.

FIG. 355.—Fameuse.

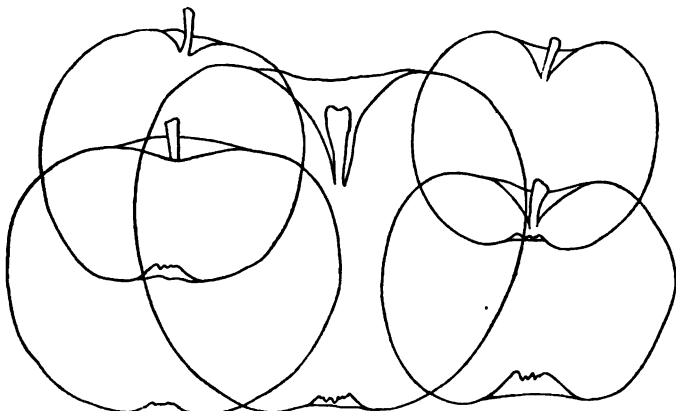


FIG. 354.—Oldenburg.

FIG. 352.—Twenty Ounce.

FIG. 356.—Melon.

Kane. (Cane, Cain.) Size medium, roundish-oblate, often obscurely conical, regular; surface fair and beautiful, highly polished, indistinctly striped with brilliant light crimson, gradually merging into delicate blush color on the shaded part; stalk often very short; cavity acute, narrow; basin regular; flesh yellowish white, with a pleasant, good flavor. Hardly of the highest quality, but much admired for its beauty. Late autumn. A native of Kent County, Delaware.

Late Strawberry.* (Strawberry, Autumn Strawberry.) Size medium; roundish, slightly conical, sometimes faintly ribbed; nearly whole surface with small broken streaks of light and dark red; stalk slender, about an inch long; basin ribbed, flesh yellowish white, slightly fibrous, very tender and juicy, with a fine, very agreeable, sub-acid flavor. Young trees of remarkably thrifty growth, leaves sharply serrate, which at once distinguishes them from the crenate leaves of the Early Strawberry. Ripens early in autumn, and often keeps till winter. Very productive. Fig. 353. One of the best early autumn apples. Succeeds well in the West.

Leland Spice. (Leland Pippin.) Large, roundish, obscurely conical, slightly ribbed; whole surface with brilliant red streaks on yellow ground, dotted with yellow; stalk half an inch long; cavity and basin ribbed; flesh yellowish white, sub-acid, spicy, rich, fine. October. Origin, Sherburne, Mass.

Long Island Seek-no-further. Large, oblate, conical; skin yellow, striped and splashed with red; flesh tender, with a good sub-acid flavor. October to February. An old variety. Tree productive. Origin unknown.

Lyscom. Large, round, with broad, broken, distinct, pale red stripes, on yellowish or greenish yellow ground; stalk three-fourths of an inch long, slender; calyx deep set; flesh fine grained, mild, slightly sub-acid, moderately rich, good flavor. Middle and late autumn. Massachusetts.

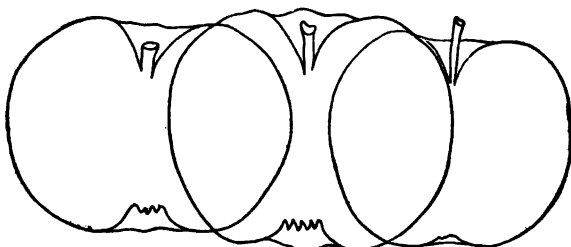


FIG. 357.
Jefferia.

FIG. 358.
Gravenstein.

FIG. 359.
Sops of Wine.

Magnolia. Size medium, oblate-conical; striped and mottled with crimson on yellow; stalk short; cavity broad, uneven; basin small; flesh white, tender, with a brisk aromatic flavor. Growth moderate, productive. Mid-autumn.

Mangum. Medium, oblate, slightly conic, ribbed; shaded and striped with red on yellow with numerous dots; stalk small, in a broad, russeted cavity; basin slightly furrowed; flesh yellow, very tender, with a mild sub-acid excellent flavor. A valuable Southern apple. Tree thrifty, productive.

Melon.* (Watermelon, Norton's Melon.) Medium or large, roundish, often slightly conical, frequently a little irregular; color, with stripes and dots of bright red on yellow ground, or clear red on pale yellow; stalk an inch long, slender; cavity acuminate; basin deep; flesh white, tender, very juicy, fresh, and pleasant, spicy, sub-acid or slightly sub-acid, fine flavored. Growth rather slow. Late autumn and early winter, but often keeps longer. Fig. 356. An excellent table apple, but a moderate bearer. Origin, East Bloomfield, N. Y.

Melt in the Mouth. Medium or rather small, roundish, slightly flattened; skin greenish yellow, indistinctly striped and shaded with red, with russet dots; stalk short; cavity shallow, obtuse; calyx open; flesh yellow, with a rich, aromatic, rather acid, and very good flavor. Ripens through autumn. Pennsylvania.

Mexico. Size medium, roundish; striped light and dark red; stalk large and long; cavity broad, shallow, russeted; calyx large, in a narrow basin; flesh whitish stained with red, tender, with a very good flavor. A handsome New England fruit. Tree very hardy, productive.

Myer's Nonpareil. (Ohio Nonpareil.) Large, roundish, slightly oblate; marbled and splashed red on yellow; cavity and basin medium; flesh yellowish white, with an excellent sub-acid flavor. Autumn. Growth strong and straight, forming a compact head. Productive, and much valued at the West.

Oldenburgh.* Medium or rather large, roundish, a little flattened at the ends; light red in broad broken stripes and splashes on yellow ground; stem short, in an acuminate cavity; basin deep and narrow; flesh yellowish white, sub-acid, very handsome. Good for cooking. Early autumn. Shoots dark, ascending. Very hardy. Succeeds well at the West and North. The strong growth of the tree, its early bearing and endurance of severe winters, and the fair and handsome appearance of the fruit, render it one of the most valuable sorts for the West. Fig. 354.

Orndorf. Size medium, roundish; slightly striped and shaded red on yellow; stalk slender; cavity and basin deep; calyx open; flesh yellowish, crisp, with an excellent sub-acid flavor. A moderate bearer. October and November. Ohio.

Rambo.* (Romanite of New Jersey.) Size medium, oblate, smooth; streaked and marbled with dull yellowish red on pale yellowish ground; dots large; whitish; stalk an inch long, rather slender; basin broad, slightly plaited; flesh tender, rich, mild sub-acid, fine flavored, often excellent. Fine in nearly all localities. Late autumn and early winter. Known by the erroneous name of Seek-no-further in Philadelphia market. Fig. 341. Tender far West.

Red Summer Calville.* Medium, regular, oblong-conical; yellowish white, mostly covered with rosy red, mottled and splashed with darker red, basin very shallow, almost wanting, flesh white, fine grained, spicy, sub-acid, quality best. Early autumn. Fig. 345. Russian.

Republican Pippin. Large, round-oblate; striped with red on a mottled reddish ground, greenish yellow in the shade; stalk an inch long, slender; cavity sometimes with radiating russet rays; flesh tender, sub-acid, with a pleasant, peculiar, somewhat walnut flavor. Ripens early and mid-autumn, but is a good cooking apple in summer. Excellent for drying. Tree a strong and crooked grower—moderate bearer. Origin, Lycoming County, Pa.

Ribston Pippin. Medium or rather large, roundish conical; clouded and striped with yellowish red, on a yellow and slightly russeted ground; stalk slender, often short; cavity rather wide; basin narrow, angular; flesh yellow, crisp, granular, juicy, with a very rich and rather sharp or acid flavor. First-rate as far north as Maine, often second-rate farther south; but its quality is usually suffered to deteriorate needlessly by remaining too long on the tree. Late autumn and early winter. Shoots diverging or spreading; buds and young shoots rather hoary. English.

Richards' Graft. (Derrick's Graft, Red Spitzenburgh.) Rather large, roundish-oblate; striped red on yellow; cavity large; basin deep; flesh fine grained, tender, with a refreshing, sub-acid, very good flavor. September and October. Cultivated on the Hudson River.

Shiawassee Beauty. Medium, oblate, regular, smooth; deep brilliant red on greenish yellow ground; stalk very short, deeply sunk; basin small, regular; flesh white, tender, crisp, sub-acid and aromatic. October and November. Resembles Fameuse, but tree a stronger and more upright grower.

Smokehouse.* Medium or rather large, oblate, regular; mottled, and indistinctly striped with red on yellow ground; a slight greenish cast at the crown; stalk one inch long, slender, cavity wide, acute; basin rather distinct; flesh yellowish white, rich, aromatic, fine sub-acid flavor. Mid-autumn to winter. Origin, Chester County, Pa. Succeeds in the Middle States.

St. Lawrence. (Corse's St. Lawrence.) Large, roundish, slightly oblate, and sometimes a little conical, obtuse; whole surface broadly and very distinctly striped with very dark red, on light greenish yellow ground; stem rather short and slender, cavity wide; basin round, deep, with a very obtuse rim; flavor rather acid, moderately rich, agreeable. A very handsome and productive apple, of good second-rate flavor, ripening about mid-autumn. Canadian.

Soulard. Medium, round oblate, slightly angular; whitish, striped bright red, dots few, brown; stalk short, cavity large; basin medium, corrugated; flesh white, tender, juicy, sub-acid. Very good. Late autumn. Fig. 351. Missouri.

Titus. Large, round; greenish yellow, striped with red; cavity deep, stem medium; basin wide, shallow; flesh fine-grained, juicy, sub-acid, the best of the Titus family of Russian apples. Late autumn. Fig. 401. Russian.

Twenty Ounce.* (Cayuga Red Streak, Twenty Ounce Pippin erroneously.) Very large, roundish, remotely conical; surface sometimes smooth, often very wavy; color striped rich yellowish red on greenish yellow or yellowish white ground; stalk three-fourths inch long; sub-acid, rather coarse, second quality. Very showy, fair, and productive. Fig. 352. A profitable market sort. Late autumn and early winter. Growth in large trees becoming straggling. Western New York. The Twenty Ounce Pippin is a large, green, third-rate fruit.

Vandevere Pippin. (Watson's Vandevere, Indiana Vandevere.) Large, oblate, remotely conic; striped and blotched with light red on yellow; stalk short, cavity large; flesh greenish yellow, firm, crisp, brisk sub-acid. Culinary. Western. November and December.

Washington Strawberry. Rather large, roundish-conic, slightly oblate; striped and splashed with deep crimson on yellow; cavity deep; flesh yellow, a little coarse, brisk sub-acid. Growth vigorous. September, October. Origin, Washington County, N. Y.

Winter Pear.* Rather small; yellow striped, splashed and marbled with red; cavity rather deep; stem medium, basin narrow, regular; flesh yellowish, fine-grained, juicy, very spicy, mild sub-acid with a decided pear flavor. Early autumn. Fig. 360. Russian.

Section II.—Not Striped.

Bailey's Spice. Fruit medium, roundish-conic; light yellow with a faint blush; stalk large, deeply set; calyx closed, basin moderate; flesh fine-grained, tender, spicy, rich, sub-acid. Mid-autumn. Origin, Plattsburgh, N. Y.

Bellerdovskoe. Large, round, regular, smooth; greenish yellow, bronzed in the sun; cavity regular, acute; stem short, basin wide, shallow; flesh white, juicy, sub-acid, good. Early autumn. Fig. 363. Russian.

FIG. 360.—Winter Pear. FIG. 361.—Raspberry.

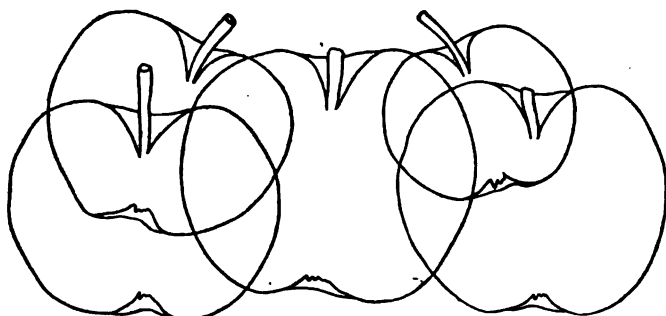


FIG. 362.
Blushed Calville.

FIG. 363.
Bellerdovskoe.

FIG. 364.
Liveland Raspberry.

Bietigheimer. (Red Bietigheimer.) Large, round, oblate; dark yellow, covered with purplish crimson; flesh firm, sub-acid, good. Tree a vigorous grower and free bearer, hardy. German.

Blushed Calville. Medium, roundish oblate; yellow, blushed on side; cavity large, oblique; basin narrow, corrugated; flesh reddish white, fine-grained, sub-acid, quality good. Season August, following Yellow Transparent. Fig. 362. Russian.

Capron's Pleasant. Rather large, roundish-oblately; greenish yellow; stem rather stout; calyx large; cavity and basin medium; flesh yellow, tender, mild, sub-acid, agreeable. September and October.

Cracking. Large, roundish; light yellow, with a tinge of red in the sun; stalk slender, in a deep, narrow, acuminate cavity; basin deep and narrow; flesh a little coarse, yellow, with a pleasant breaking texture, and a very good sub-acid flavor. Valuable at the West.

Disharoon. Rather large, roundish-oblate, slightly conical; yellowish green; stalk short, cavity large, calyx small; basin rather deep and narrow; flesh white, with a fine sub-acid, aromatic flavor, resembling that of Newtown Pippin. November, December. Georgia.

Drap d'Or or "Cloth of Gold." Large, roundish, sometimes slightly oblong-conical, more frequently rather oblate; bright yellow, with numerous black specks; stalk short; basin shallow, plaited; sub-acid, mild, agreeable. Early autumn, extending to mid-autumn. Tree regular, spreading; leaves doubly serrate.

Duckett. Rather large, roundish-oblate; light greenish yellow, slightly ribbed; stalk short, deep set; basin deep; flesh fine-grained, mild, sub-acid. Late autumn. A good southern fruit.

Dyer.* (Pomme Royal, which is the original name.) Rather large, roundish, often approaching round oblong, sometimes slightly flattened, obscurely ribbed; light yellow, rarely a faint brown cheek, and sometimes a slight russet network over the skin; stalk three-fourths to one inch long; basin often deep and large, ribbed; flesh very fine-grained, tender, very juicy, with a rich, sub-acid, or rather acid, excellent flavor, having but few equals. Fig. 365. Season variable; November, December. Productiveness variable. An early bearer.

Ernst's Pippin. Large, oblate, smooth; pale greenish yellow, with a brownish cheek; cavity wide, basin wrinkled, calyx open; flesh tender, sub-acid, very agreeable. Mid-autumn. Cincinnati.

Esten. Large, oblong-ovate, slightly ribbed, smooth; yellow, sometimes a blush; dots large, green and red; stalk one inch long, slender; cavity very deep; basin shallow; flesh white, fine-grained, mild sub-acid. Tree vigorous, very productive. Rhode Island.

Fall Harvey. Large, roundish-oblate, nearly regular; pale yellow; stalk slender, one inch long; cavity moderate; basin medium in size, furrowed; flesh fine-grained, juicy, good, mild sub-acid flavor. Moderate or poor bearer. Essex County, Mass.

Fall Orange.* (Holden Pippin.) Large, roundish-ovate, or oval; light greenish yellow, becoming pale yellow, rarely a brown cheek; stalk half an inch long, cavity narrow; basin even-rimmed, slightly plaited; sub-acid, tender, good, best when fresh from the tree. Shoots very stout, dark colored. Tree very hardy, bears while very young, fruit always fair.

Fall Pippin.* (Holland Pippin, erroneously.) Very large, roundish, obtuse, somewhat oblong-conical, a little flattened at the ends, sometimes with large obtuse ribs; color greenish, becoming a high rich yellow when ripe, with some large shades of green about the crown before fully ripe; stalk large, in an acuminate cavity, basin deep; flesh yellowish, rather firm, becoming tender, rich, aromatic, excellent. Leaves sharply serrate, shoots vigorous, rather dark, diverging, becoming spreading; tree large. Late autumn, keeping into mid-winter. Mostly a moderate bearer—fruit sometimes water-cored. Excellent for cooking. Fine in nearly all localities. Fig. 368.

Hawley. (Dowse.) Quite large, roundish, slightly conical, sometimes nearly round, with a broad obtuse apex, and slightly flattened, smooth; pale green becoming yellow, sometimes a very faint orange cheek; stalk one-half to one inch long, slender; cavity wide, deep, acute, sometimes slightly obtuse; basin deep, slightly furrowed; flesh yellowish white, fine-grained, quite tender, with a mild, rich, sub-acid, fine flavor. Ripens at mid-autumn. Shoots of rather slow growth. Origin, Columbia County, N. Y. Liability to dry rot and water-core has rendered it of little value. Fig. 339.

Holland Pippin. Very large, roundish, somewhat oblong, and flattened at the ends, sometimes slightly oblate; greenish yellow, becoming pale yellow or whitish yellow, with a brownish red cheek; stalk variable in length, usually short; cavity wide, acute; basin slightly plaited; flesh nearly white, rather acid, with a moderate flavor. Ripens early and mid-autumn, but is a good cooking apple some weeks previously. Wholly distinct from the Fall Pippin. An excellent culinary sort.

Hunge. Rather large, roundish, somewhat irregular and oblique; skin smooth, bright yellow, with a faint delicate blush; stem half an inch long; basin rather deep, slightly ribbed; flesh fine-grained, tender, sub-acid, "very good." Much cultivated in North Carolina. September and October.

Keswic Codlin.* Rather large, somewhat conical, and ribbed; greenish yellow, becoming light yellow; stalk short, deep set; calyx rather large; juicy, pleasant acid, quality moderate. Succeeds well at the West. Fine for cooking; very productive, bears early. Ripens in September but may be used for cooking in summer.

Lowell.* (Orange, Tallow Apple, Tallow Pippin, Queen Anne, of Northern Ohio.) Large, roundish-oblong, obtuse, slightly conical; green, becoming rich yellow; surfaces lightly oily; stalk one inch long; basin deep, furrowed or plaited inside, rim obtuse, even; flesh yellowish white, rather coarse, rich sub-acid, or rather acid; hardly first quality, but valuable for its fair surface and great and early productiveness. Early autumn. Tree rather slender and a moderate grower.

Maiden's Blush.* Rather large, oblate, smooth, and regular; with a fine, evenly shaded red cheek or blush on a clear pale yellow ground; stalk short; cavity rather wide; basin moderate, even; flesh white, fine-grained, tender, pleasant sub-acid, but not rich. Mid-autumn. Tree spreading. Although deficient in richness, it is valued for its fair, tender, and beautiful fruit, and uniform productiveness. Fig. 367. Valuable at the West.

Porter.* Above medium, oblong-ovate-conical, regular, often ribbed at apex; bright yellow, sometimes a dull blush in the sun; stalk one inch long, slender, cavity rather small; basin narrow; flesh tender, rich, rather acid, of fine flavor. Fair and productive. Early autumn. Succeeds in the Northern and Middle States. Leaves sharp, serrate. In some localities this fruit proves too acid for the table. Fig. 338.

Sweet Pearmain. (Henrick Sweet.) Medium size, roundish or ovate-conical; dark rich red, with rough dots; stalk an inch long, slender, cavity wide, round; calyx woolly, basin very small; flavor sweet and rich. Through winter. Introduced from England before the Revolution. Much valued in central Ohio and farther West.

Sweet Romanite.* (Sweet Nonsuch, of Illinois.) Size medium, roundish oblate, regular; striped and shaded with bright red on greenish yellow; stalk short; calyx large, open; basin shallow, furrowed; flesh greenish yellow, firm, crisp, juicy, sweet. Keeps through winter. Fig. 372. Valuable at the West.

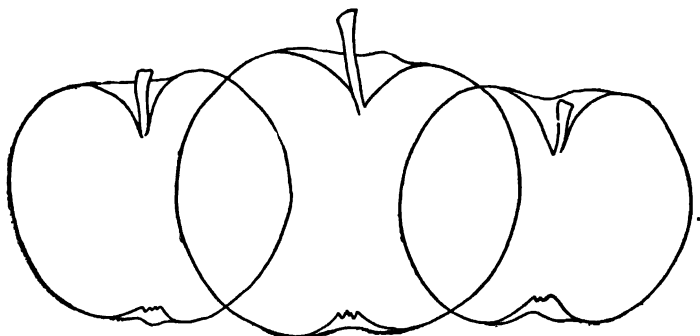


FIG. 370.
Ladies' Sweeting.

FIG. 371.
Bailey's Sweet.

FIG. 372.
Sweet Romanite.

Sweet Vandevere. (Sweet Redstreak, Sweet Harvey.) Size medium, oblong, slightly conical; shaded and striped dull red on greenish yellow; stalk small, cavity large, irregular; basin wide; flesh tender, juicy, with a rich aromatic flavor. Growth crooked, a profuse bearer. Through winter.

Wing Sweeting. Medium, roundish, slightly oblong, ribbed; color bright red in small stripes and shades on yellow skin; stalk slender, basin and apex very sharply ribbed; flesh whitish yellow, sweet, good. A good bearer, and when well grown on strong soil, a handsome and fine sweet winter apple.

Section II.—Not Striped.

Broadwell.* Rather large, slightly conical, somewhat oblate; skin thin, smooth, greenish yellow; stalk short, small, deep set; flesh white, tender, sweet, juicy, fine—and one of the best winter sweet apples. Keeps through winter late into spring. Ohio. Fig. 336.

Camak's Sweet. Size medium, roundish-conical; light green with a warm cheek; stem short or long, cavity narrow; calyx open, basin deep; flesh firm, sweet, very good. A Southern fruit.

Danvers Winter Sweet.* Medium or rather large, roundish, remotely oblong or conical, obscurely ribbed; greenish yellow, becoming a rather dull rich yellow, sometimes an orange blush; stalk three-quarters to one inch long, cavity acute; basin smooth, narrow; flesh yellow, sweet, rich. Fig. 375. Growth vigorous, tree productive.

Green Sweet.* Large or medium, nearly round, slightly approaching ovate-conical, regular; surface green, with greenish white dots; stalk about an inch long, moderately thick, cavity rather small and narrow, round, acuminate; basin small, slightly furrowed; flesh greenish white, with a very sweet, spicy, good flavor. Fair, productive, and a long keeper. Fig. 374.

Higby's Sweet. Size medium, roundish, slightly oblate; pale yellow; stalk short; basin deep, slightly furrowed; flesh white, tender, with a good, sweet flavor. Early winter. Northeastern Ohio.

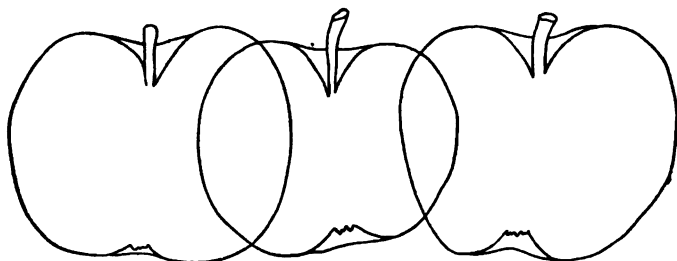


FIG. 373.
Tallman Sweet.

FIG. 374.
Green Sweet.

FIG. 375.
Danvers Winter Sweet.

Honey Greening. Large, oblong, oval; greenish yellow with green and gray dots; stalk long, slender, deeply set; basin broad, deep; flesh tender, mild, sweet, slightly aromatic. Grown at the West. Tree vigorous, upright, an early and constant bearer. November and December.

Leicester Sweet. (Potter Sweet.) Rather large, oblate; greenish yellow and dull red; tender, rich, excellent, fine for dessert or baking. Winter. Tree vigorous, not very productive. Origin, Leicester, Mass.

London Sweet. (Heicke's Winter Sweet.) Rather large, oblate; pale yellow; stalk very short, deeply set; basin abrupt; flesh whitish, tender, with a fine, sweet, aromatic flavor. Early winter. Tree upright, a good annual bearer.

Tallman Sweeting.* (Tolman's Sweeting.) Medium or rather large, roundish-oblate, slightly conical; clear light yellow, with a clear brownish line from stalk to apex; stalk nearly an inch long; calyx in a distinct, slightly wrinkled basin; flesh white, firm, rich, very sweet. Excellent for winter baking. Keeps into spring. Young tree vigorous, upright, shoots becoming spreading; leaves wavy. Fig. 373. Productive. Hardy.

Wells' Sweeting. Medium in size, roundish, tapering slightly to base and apex; color light green, with a brownish cheek; stalk short; basin shallow; flesh very white, tender, rich, agreeable. Early winter. Newburg, N. Y.

Winter Sweet Paradise. Rather large, roundish; skin pale greenish yellow with a brown blush; stalk short; calyx and basin small; flesh white, with a sweet, "very good" flavor. Ripens through winter. Origin, Pennsylvania. Succeeds well at the West.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section 1.—Striped with Red.

Ailes. Large, oblate; striped and shaded red on yellow; stalk short, cavity narrow, basin medium; flesh yellow, crisp, firm, with a rich, sub-acid, "very good" flavor. Keeps through spring. Chester County, Pa.

Anis.* Small, oblate conical, ribbed; yellow, nearly covered with dark crimson in strips and splashes; cavity deep, stem short, stout; basin wide, shallow; flesh firm, fine grained, sub-acid, aromatic; quality best when properly ripened. This apple belongs to a family grown on the upper Volga in Russia, on a large scale, all of which are valuable for cultivation in the northern limits of fruit culture. Fig. 399. Russian.

Anisovka. Large, oblate; yellowish, striped and splashed with red; flesh yellowish white, juicy, sub-acid; cavity large, stem medium, basin wide, deep. This belongs to the Oldenburg family and resembles the Oldenburg in the tree and in the size, shape, and markings of the fruit. It has also proven hardy in the Northwest. Fig. 418. Russian.

Arkansas Black. Medium, slightly conical, regular, smooth, glossy; yellow, generally covered with deep crimson, small light-colored dots; basin shallow; eye small, closed; cavity shallow, russeted; stem medium; flesh very yellow, fine-grained, firm, juicy, sub-acid, rich, very good. Fig. 444.

Babbitt. Large, oblate conical, angular, smooth; greenish white, shaded and striped with red, dots light, few; cavity large, deep, regular; stem short; basin medium, regular, furrowed; calyx shallow; eye small, closed; flesh yellowish white, fine-grained, juicy, brisk, sub-acid; excellent cooking apple. Strong grower, hardy, productive.

Baer. Rather small, roundish-oblate; striped red on greenish yellow; stalk long, cavity wide and deep; basin small, plaited; flesh tender, fine grained, pleasant, very good—keep still spring. Berks County, Pa. Identical with Hiester.

Baldwin.* Rather large, roundish, with more or less of a rounded taper towards the apex; shaded and striped with yellowish red and crimson on yellow ground; stalk three-fourths of an inch long,

rather slender; calyx in a narrow, slightly plaited basin; flesh yellowish white, with a rich, sub-acid flavor. Young tree vigorous, upright, shoots dark brown, diverging and ascending. Fig. 380. Very productive. Ripens through winter. A first-rate winter apple in New England, New York, and Michigan; mostly unsuccessful at the West and South. Too tender, and mostly fails as far north as Maine, unless grafted standard height. The Baldwin is liable to vary in character; the Late Baldwin appears to be identical, but modified by external causes.

Ben Davis.* (New York Pippin, Kentucky Streak, Carolina Red Streak, Victoria Red.) Large, roundish-ovate, slightly oblique, regular, smooth, striped red on yellow; stalk long, deep set; basin deep, wrinkled; flesh whitish, tender, with a mild, good, but not rich, sub-acid flavor. Fig. 376. Succeeds well at the West, where it proves one of the most profitable winter apples for market; does not mature well at the extreme North. An early and abundant bearer.

FIG. 376.—Ben Davis.

FIG. 377.—Dutch Mignonne.

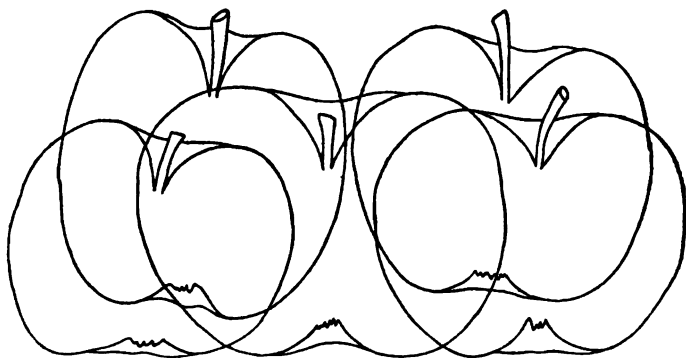


FIG. 378.—Prior's Red.

FIG. 379.—Dominie.

FIG. 380.—Baldwin.

Bethlehemite. Medium, roundish-oblate, remotely conical; striped red on yellow; stalk short, deeply set; basin deep; furrowed; flesh yellowish white, tender, with a mild, sub-acid, very agreeable flavor. Ripens through winter. Growth strong, upright. Ohio.

Black Gilliflower. Rather large, oblong-ovate, long conical, regular, obscurely ribbed; surface dark, dull, reddish purple, inclining to greenish yellow where densely shaded; cavity very narrow, acuminate; basin very small, ribbed; flesh greenish white, with a rich, good, slightly sub-acid flavor, becoming dry when ripe. Keeps through winter and late into spring. Shoots dark, rather crooked, fruit always fair; very productive. Rejected by most cultivators on account of its very dry flesh, but a good baking variety. Totally distinct from the Red or Cornish Gilliflower.

Blue Pearmain.* Very large, roundish, inclining to oblong, slightly and obtusely conical; dark purplish red in large broken stripes on lighter ground; bloom conspicuous; dots large; indistinct; stalk three-fourths of an inch long; calyx deep set; flesh yellowish, mild sub-acid, good. Early winter. A thin bearer.

Boardman. Medium, roundish; light yellow, splashed, streaked and dotted crimson; stem short; cavity open and rather deep; basin large, deep; flesh very white, crisp, juicy, sub-acid, good. Winter. Maine.

Brightwater. Large, round, conical; greenish yellow, mottled russet, splashed and striped dull red, dots minute yellow and brown; skin thick; flesh greenish yellow, fine-grained, juicy, sub-acid, good. Arkansas.

Bryant. Large, roundish oblate; greenish yellow, shaded with dull red and striped darker, dots numerous, large, gray, many with rough prominent centres, gray over all color; flesh yellow, coarse, tender, juicy, mild sub-acid. Virginia.

Buff. Large, round, oblate, smooth; distinctly striped with light and dark red; cavity broad and deep; basin round, furrowed; flesh white, tender, sub-acid, mild, agreeable, "good," or perhaps "very good," sometimes poor. Much valued at the South.

Bullet. (North Carolina Greening, Green Abram.) Rather small, roundish; striped with light and dark red on greenish yellow; stalk short, often with a lip at base, cavity small; basin deep; flesh tender, juicy, with a pleasant sub-acid flavor. Valuable in Virginia and North Carolina as a long keeper. Tree productive.

Cannon Pearmain. Rather large, roundish or oblong-conical; red on yellow; cavity small, basin abrupt; flesh yellowish, firm, rich, spicy, mild sub-acid. Keep still spring. Tree vigorous, spreading, productive. South and Southwest.

Carnahan's Favorite. Large, roundish conic; red on yellow; cavity and calyx large, basin furrowed; flesh fine-grained, pleasant, sub-acid. Tree vigorous, productive. Keeps till spring. Ohio.

Carolina Queen. (Carolina Winter Queen.) Rather large, roundish, slightly oblate, smooth and regular; greenish yellow shaded and striped with light dull red; stalk three-fourths of an inch long, cavity wide and rather inclining to obtuse, basin ribbed; flesh yellowish white, sprightly sub-acid, of an excellent flavor. Early winter. Popular in North Carolina.

Carter. (Mangum.) Medium to large, roundish-ovate; red on orange yellow; stalk rather short, cavity deep, calyx large, open, in a wide, deep, somewhat furrowed basin; flesh tender, mild, pleasant. One of the best apples in the Southern States.

Carthouse. (Gilpin, Romanite, Red Romanite, and Small Romanite, of the West.) Medium or rather small, roundish-oblong, nearly regular, apex flattened; striped and shaded deep red on greenish yellow ground; stalk one-half to an inch long, slender; basin slightly furrowed, wide, distinct; flesh tough, crisp, fresh,

agreeable, mild sub-acid, nearly sweet, of moderate quality. Keeps fresh till late in spring. Much cultivated as a long keeper at the West.

Chandler. Large, roundish, slightly flattened, somewhat angular; striped and shaded red on greenish yellow; stalk short, cavity large, calyx small, in a wide, plaited basin; flesh greenish white, tender, with a moderately rich, sub-acid flavor. Early winter. Connecticut.

Cogswell. Rather large, roundish-oblate, regular; striped rich red on yellow; stalk small, cavity large, russeted; calyx short, basin small; flesh yellowish, compact, tender, scarcely sub-acid, with a fine, rich, aromatic flavor. Through winter. An excellent dessert fruit. An abundant bearer every other year. Connecticut.

Cooper's Red. (Cooper's Market, Cooper's Redling.) Size medium, oblong conical; shaded and striped with red on yellow; stalk short, cavity deep, narrow; basin small; flesh white, tender, with a brisk sub-acid flavor. Through winter. Shoots long, slender. Profitable, although not of highest quality. New Jersey, New York and Michigan.

Cranford.* Large, oblate; yellow, covered with brownish red, splashed and streaked with light crimson; stem short, thick; basin broad, deep, russeted; calyx wide, deep; flesh yellow, juicy, sub-acid, sprightly. Tree good grower, fair bearer. Winter. Arkansas.

Cross. Medium, regular, oblate; yellow, splashed and striped with crimson, much like Fameuse; cavity deep; basin shallow; flesh white, sub-acid, very good. Fig. 379. Midwinter. Russian.

Cullasaga. Rather large, roundish; slightly conical, striped crimson on yellow; stalk short, slender; cavity deep, russeted; calyx open; basin shallow, furrowed; flesh yellow, tender, very mild, aromatic, rich. A well-known, long-keeping, valuable Southern fruit.

Detroit. (Red Detroit.) Medium or rather large, roundish or slightly conical; skin thick, smooth, dark purple when mature; cavity deep; basin shallow, plaited; flesh white, often stained with red, crisp, of an agreeable sub-acid flavor.

The Black Detroit, or Grand Sachem, is a larger apple, more irregular; rather dry fruit of inferior quality.

Dominie.* (Wells, of Ohio.) Rather large, roundish oblate; surface with narrow and distinct stripes of light red, on whitish yellow ground; dots or specks large, rough; stalk three-fourths of an inch long; cavity wide, deep, acute; basin deep, obtusely ribbed; flesh white, firm, mild sub-acid, spicy, fine flavored. Fig. 379. Shoots very long, vigorous, diverging, leaves drooping, coarsely serrate. Productive. Keeps through winter. Tender at the West.

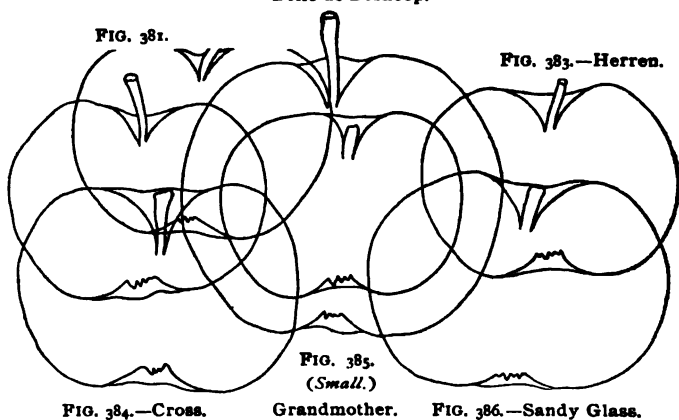
Dutch Mignonne.* Quite large, roundish, regular; rich orange,^d dotted, mottled, and obscurely striped with bright red, slightly

russeted; stalk nearly an inch long, slender; calyx large, open; basin large, round, even; flesh firm, becoming tender, with a high, rich, rather acid flavor. Fig. 377. Early winter. Native of Holland. A large, handsome, high-flavored, but coarse fruit.

Edgar Red Streak. Large, roundish oblate; red streaked; flesh tender, juicy, sub-acid, vigorous, hardy. Tree prolific bearer, good. Winter.

Elkhorn. Large, oblate, regular; yellowish, striped red and brown, dots light gray, large, and numerous; basin large; eye closed; cavity wide, deep, russeted; stem very short, slender; flesh yellowish, coarse, juicy, sub-acid, pleasant, good. Arkansas.

FIG. 382.
Belle de Boskoop.



Eustis. (Ben.) Rather large, roundish, very slightly ovate; striped and dotted with light rich red on rich yellow; stalk very short; basin narrow, rather deep; flesh yellowish, rich, sub-acid, fine. Origin, Essex County, Mass.

Evening Party. Rather large, oblate, slightly oval; yellow, striped with red; stalk short, inserted in a round, deep cavity, often russeted; calyx closed, basin large; flesh juicy, tender, crisp, with a vinous, aromatic flavor. An excellent dessert fruit. Tree health, vigorous, a good bearer. December and January. Pennsylvania.

Flushing Spitzenburgh. Medium, roundish conical; rich red on yellow, with large whitish or fawn spots; cavity, basin, and calyx small; flesh whitish yellow, crisp, with a very mild sub-acid, moderate flavor. Early winter. Shoots strong, brown, unlike the slender, gray shoots of Esopus Spitzenburgh.

Good Peasant. Medium; greenish yellow, splashed and striped red on the sunny side; cavity russet; basin deep, wrinkled; stem medium; flesh fine-grained, sub-acid, very good; season, mid-winter. Russian.

Grandmother. Medium, regular, roundish oblate; green, striped and splashed with red; calyx broad, large; basin narrow; stem short, stout; flesh firm, juicy. Fig. 385. Mid-winter. Russian.

Granite Beauty. Large, roundish-ovate, longest at middle, ribbed; skin yellow, striped bright red; stalk short, slender; cavity rather small, ribbed; basin medium, furrowed; flesh juicy, rich sub-acid, quality medium. Early and mid-winter. Growth rather spreading. New Hampshire.

Hall.* Rather small, roundish, slightly oblate; striped red on greenish yellow, with russet dots; stalk slender, curved; cavity round, medium; basin small, plaited; flesh yellowish, fine-grained, with a very rich, mild sub-acid, aromatic flavor. Through winter. A widely cultivated and highly esteemed Southern variety. Growth moderate, upright, shoots slender, reddish. Fig. 387. Hardy.

Herefordshire Pearmain.* (Royal Pearmain, Winter Pearmain, erroneously.) Medium in size, round-oblong, approaching obtuse-conical; surface mostly covered with indistinct stripes and soft clouds of light red on greenish yellow, which on ripening becomes a pale clear yellow; stalk half an inch long, cavity small; calyx large, open; basin narrow, plaited; flesh yellowish white, fine grained, with a pleasant, mild sub-acid, aromatic, fine flavor. Early winter. Best on light soils. Distinguished from Winter Pearmain by its stronger shoots, less oblong form, and by the soft shades and clouds of fine red, which cover the surface. Fig. 391.

Herren. Medium, regular, oblate; yellow, nearly covered with dark red, splashed crimson; basin wide; stem medium; flesh white, sub-acid. Early winter. Poland. Fig. 383.

Hess. Medium, roundish or conical; striped with red; stalk short, rather stout; cavity narrow, deep; basin deep, narrow; flesh greenish white, tender, with a very good, aromatic flavor. Through winter. Pennsylvania.

Hollow Crown. Size medium, oblong, oval, flattened at crown; skin yellow, striped and splashed with red; stalk short, in a moderate cavity; calyx closed, basin broad; flesh yellowish, with a sprightly excellent flavor. October, January. (Downing.)

Hubbardston.* Large, round-ovate, largest at the middle, nearly regular; color with small broken stripes and numerous dots of light rich red on a rich yellow ground; stalk three-fourths to one inch long; cavity acute, russeted; calyx open, basin ribbed; flesh yellowish, very rich, slightly sub-acid, with a strong mixture of a rich sweet flavor, excellent. Early winter. A famous New England sort—fine at the North and Northwest. Shoots rather slender, gray. A native of Hubbardston, Mass. Loses flavor by keeping.

Indiana Favorite. Medium, oblate, regular, handsome; shaded and striped with red on rich yellow, with large yellow russet specks; stem short, cavity wide, calyx open, in a moderate even basin; flesh yellowish, crisp, a mild sub-acid, agreeable flavor, "very good." Tree spreading, excellent bearer. Keeps remarkably well. It is a seedling of the Vandevere Pippin and resembles it, except in being of a deeper red and much less acid, and superior in flavor.

Jersey Black. Size medium, round, somewhat irregular; striped blackish red on lighter red, with numerous small dots; flesh often stained; stalk variable, cavity deep; basin shallow, plaited; flesh yellow, crisp, juicy, mild sub-acid, agreeable. Early winter. Tree vigorous, but does not grow large; spreading, productive. A valuable market apple at the West.

FIG. 387.—Hall.

FIG. 388.—King.

FIG. 389.—Jonathan.

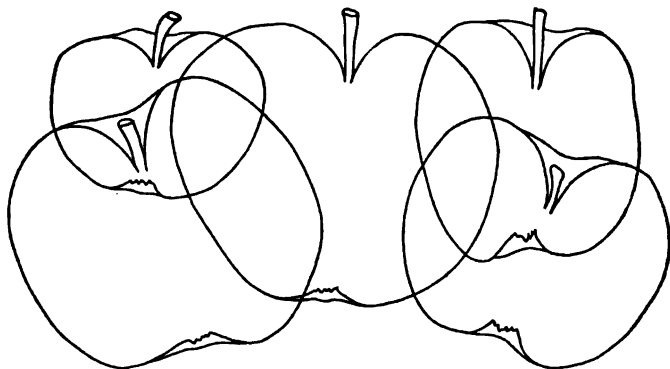


FIG. 390.—Smith's Cider.

FIG. 391.—Herefordshire Pearmain.

Jonathan.* Medium in size, round-ovate, or approaching truncate-conical; regular, nearly covered with brilliant stripes of clear red on a pale yellow ground; stalk slender; basin very distinct, rather deep; flesh white, very juicy, spicy, sub-acid, moderately rich. Keeps through winter. Shoots slender, diverging; tree very productive; fruit always handsome and fair. Fig. 389. Kingston, N. Y.

The slender growth of the tree is an objection with cultivators. It succeeds well in most localities.

Jones' Seedling. Medium, round conical; light yellow, striped red; flesh sub-acid, almost sweet. Winter. Tennessee.

Kaiser. (Red Seek-no-further.) Size medium, roundish-oblate, often slightly oblique; shaded and obscurely striped with red on greenish yellow; stalk short, cavity large; basin shallow, sometimes deep, furrowed; flesh fine-grained, mild sub-acid, slightly aromatic, with a very good flavor. Small specimens have a small cavity and are smooth, regular, and are free from ribs. Early winter. Southeastern Ohio. Growth resembles Rambo.

King. (Tompkins County King.) Large, sometimes quite large, roundish, ribbed; color a deep red, in stripes; flesh tender, juicy, rich, high flavored. Tree a strong grower with few branches. Shoots slightly flexuous: a good but not heavy bearer. Drops its fruit rather early, and should be gathered soon. Early winter, and keeps through winter. Fig. 388. Succeeds East and West at the North, but not so well farther South.

Lacker. Rather large, oblate, somewhat irregular; striped light and dark red on greenish yellow, with conspicuous whitish specks; stalk half an inch long; basin furrowed; flesh white, fine-grained, firm, crisp, fresh, mild, agreeable, sub-acid. Keeps through winter. Cultivated in Western New York; originally from Lancaster, Pa.

Large Anis. Large, irregular conic, yellowish green, splashed and striped with red; cavity deep, stem medium, basin regular, deep; flesh fine-grained, mild acid, good. Will prove valuable north of parallel 43°, where it will keep through the winter. Fig. 400. From the Upper Volga, Russia.

Lawver. Large, roundish, regular; with surface handsomely striped with red, sub-acid, good. It is very productive and promises well for a market variety. West. Winter. Fig. 435.

Limber Twig. (James River.) Large, roundish, slightly conical; striped and splashed with red on yellow; stalk long, slender, calyx rather small; flesh yellowish, very compact, not high flavored, but cultivated in the South and West for its keeping properties. The tree is ill shapen, with pendent branches, whence its name. Distinct from the Willow Twig.

Long Stem of Pennsylvania. Rather small, roundish-oval; shaded and slightly striped with red or crimson on yellow; stalk long, slender, curved, cavity large; basin somewhat furrowed; flesh tender, crisp, with a rich, aromatic, sub-acid, excellent flavor. Berks Co., Pa. A fine dessert fruit.

McLellan. (Martin.) Medium in size or rather large, nearly round, smooth, regular; striped and mottled with lively clear red on yellow ground; stalk three-fourths of an inch long, slender; cavity narrow; basin narrow, waved; seeds small; flesh nearly white, fine grained, very tender, slightly sub-acid, agreeable, but not very rich. Early winter. Very productive. Connecticut. Fig. 396.

Mallett. Large, roundish oblate; greenish yellow, marbled red with crimson slashes; cavity shallow, stem medium; basin wide, wrinkled; flesh white, coarse-grained, juicy, sub-acid, quality good. October. In Minnesota it keeps well into the winter. Fig. 402. Russian.

Marston's Red Winter. Large, roundish-oval, regular, slightly narrowed to each end, smooth; striped with bright red and crimson on yellow ground; stalk half an inch long, slender; cavity russeted; basin abrupt, round, smooth; flesh yellowish, fine-grained, tender, juicy, high flavored. Ripens through winter. Origin, New Hampshire.

Mickel. No. 1. Large, oblate, smooth; glossy, greenish white, striped light red, dots few, white; cavity large, very deep, slightly russet; stem short, slender; basin medium, deep, abrupt, folded; eye small, closed; flesh white, fine-grained, tender, juicy, slightly sub-acid, good. Wisconsin.

Milam.* Rather small, roundish; greenish, shaded and striped with red; flesh rather firm, with a pleasant, sub-acid, moderate flavor. A good keeper. Although not of high flavor, it is widely cultivated at the West and Southwest on account of its hardiness, productiveness, and good keeping qualities. Does not succeed well farther North. Fig. 392.

FIG. 392.—Milam. FIG. 393.—Mother. FIG. 394.—Roxbury Russet.

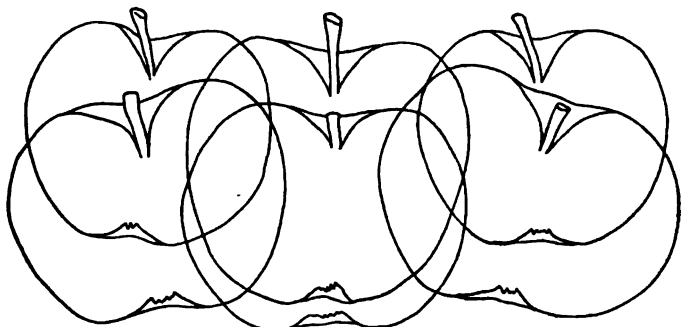


FIG. 395.—Rawle's Janet. FIG. 396.—McLellan. FIG. 397.—Nickajack.

Minister.* Large, rather irregular, oblong-conical, ribbed, surface more or less wavy, base broad, apex very narrow; very distinctly striped with red on greenish yellow ground; stalk one inch long, slender; cavity usually wide, shallow, and irregular; flesh yellowish, moderately rich, sub-acid, flavor second quality. Productive, fair, and showy. Early winter. Shoots somewhat flexuous.

Mother.* Rather large, oblong-ovate, approaching conical; slightly and obtusely ribbed; color a high warm rich red on yellow ground; deep red to the sun—in obscure broken stripes and spots; stalk three-fourths of an inch long, cavity moderate; basin small, plaited; flesh yellow, more so toward the outside, moderately juicy, rich, very spicy, very mild sub-acid, with an admixture of sweet. Somewhat resembles the Esopus Spitzenburgh in external appearance, and in its rich yellow flesh and spiciness. Growth slow. Fig. 393. Late autumn and early winter. Worcester County, Mass.

Monk's Favorite. Large, roundish, slightly oblate, ribbed; mottled and striped red on yellow; stalk short, cavity wide, calyx small in a broad basin; flesh yellowish white, with a very good sub-acid flavor. A long keeper.

Newark King. Size medium, conical; skin smooth, red in streaks on yellow ground; flesh tender, rather rich, pleasant. Early winter. Origin, New Jersey.

New York Vandevere.* (Newtown Spitzenburgh, Ox Eye.) Medium in size, round-oblate, regular; color light red in indistinct streaks on yellow ground, often a high red where exposed; dots numerous; stalk uniformly about half an inch long, cavity and basin wide; flesh light yellow, with a rich, mild, sub-acid, excellent flavor. Early winter. Not always fair—succeeds best on light soils. Shoots spotted; leaves doubly serrate-crenate.

Nickajack.* (Summerour, Berry, Edwards, Carolina Spice, Red Hazel.) Rather large, smooth, handsome, roundish, slightly oblong; splashed, striped, and mottled with deep red, and with large whitish spots; stalk short, deep set, basin moderate, rim obtuse, calyx open; flesh yellow, rather firm, sub-acid, spicy, very good. Fig. 397. Keeps till spring. Growth irregular—a good bearer. A standard Southern variety, and a good market sort in lower Ohio valley.

FIG. 398.—Recumbent. FIG. 399.—Anis. FIG. 400.—Large Anis.

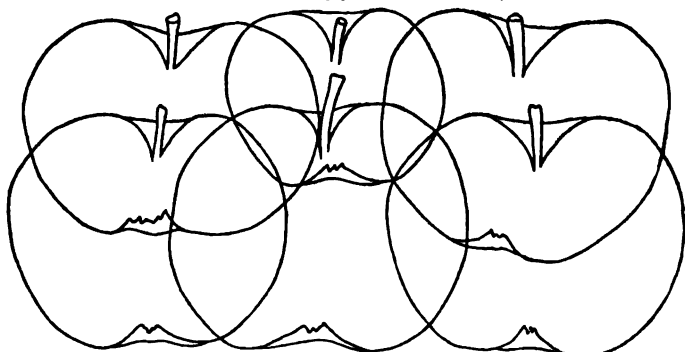


FIG. 401.—Titus (Riga). FIG. 402.—Mallett. FIG. 403.—Rambour Queen.

Northern Spy.* Large, roundish-conical, often flattened, slightly ribbed; handsomely striped with red; stalk and calyx deep set; flavor rich, aromatic, mild sub-acid, fine. Keeps through winter and late into spring; preserves its flavor remarkably fresh. Shoots dark, spotted, erect, stout. A tardy bearer. To afford fine fruit, the tree must be kept thrifty by good cultivation. A native of East Bloomfield, N. Y. A fruit of the highest quality, and profitable for market under proper cultivation, and with care in picking, assorting, and packing. Succeeds throughout the North and Northwest, but less valuable farther South. Fig. 406.

Osceola. Size medium, roundish-oblate, angular; skin yellowish, shaded and striped with red; stalk small; cavity large, russeted; basin deep; flesh yellowish, firm, crisp, mild sub-acid, "very good." A good keeper. Indiana. Resembles New York Vandevere.

Perry. Medium, oblate, regular, smooth; yellow shaded and striped bright red, dots numerous, large, russety; cavity large, deep, russet; stem short, medium; basin medium, folded; calyx short; flesh yellow, fine-grained, tender, juicy, mild sub-acid, good. A good bearer and long keeper. Ohio.

Pilot. Medium, round, regular, smooth; yellow covered by dull red, with brighter splashes of lighter red, dots numerous, large, gray, sometimes star-shaped; basin deep, regular; eye small, closed; cavity shallow, narrow, slightly russeted, stem short; flesh yellow, fine-grained, firm, juicy, mild sub-acid, rich; very good. Fig. 407. Virginia.

FIG. 404.—Willow Twig.

FIG. 405.—Winesap.

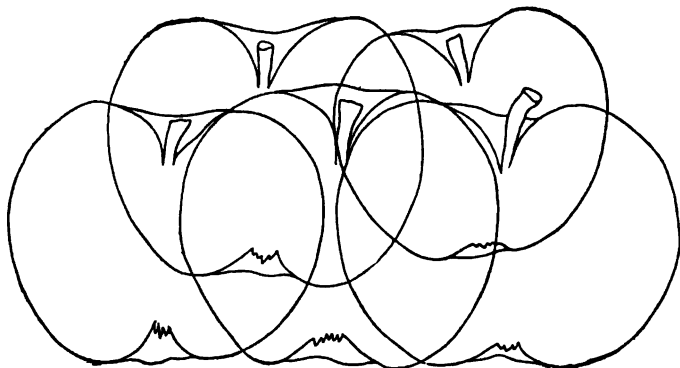


FIG. 406.—Northern Spy.

FIG. 407.—Pilot.

FIG. 408.—Rome Beauty.

Pryor's Red.* (Pryor's Pearmain.) Medium or rather large, roundish, irregular, varying, apex often broad, sometimes narrow, considerably or slightly ribbed; color dull brick red on greenish yellow in dots, shades, and obscure streaks, slightly russeted; stalk long or short, cavity small; calyx open, basin narrow; flesh very tender, mild, rich, sub-acid, agreeable. Highly esteemed in Indiana, Kentucky, and Virginia—where it keeps till spring—and succeeds well farther North. Often a poor bearer. Fig. 378.

Ragan. Large, roundish ovate; striped and marbled with red on light greenish yellow ground; stalk medium to long, cavity deep, basin deep; flesh yellowish white, of a rich, spicy, rather acid flavor. Early winter. Putnam County, Ind.

Rambour Queen.* Large, irregular oblate; greenish yellow, splashed with crimson; cavity medium, stem medium, basin wide, irregular; flesh white with greenish veinings, very juicy, sub-acid, good. Late autumn. Fig. 403. Good for keeping in cold storage. Russian.

Rawle's Jannet.* (Rawle's Jenneting, Neverfail, Rockremain.) Medium in size, roundish, approaching oblong or obtuse-conical, often oblique; color pale red, distinct stripes on light yellow ground; stalk half an inch long; flesh nearly white, fine, mild, sub-acid, fine texture, crisp, juicy. Growth slow; a profuse bearer, with a portion of the crop knotty or under size. Keeps through spring. Highly esteemed in the Ohio valley; does not succeed farther North. The blossoms open ten days later than usual, thus sometimes escaping spring frosts; and hence the name Neverfail. Hardy far West. Fig. 395.

Recumbent. (Lieby.) Large, irregular, oblate; yellow splashed red and crimson; cavity deep, regular, basin wide; skin astringent, good for cooking. Fig. 398. Russian.

Red Canada.* (Nonsuch, Old Nonsuch of Massachusetts, Richfield Nonsuch of Ohio.) Medium in size, roundish-conical, regular; nearly the whole surface covered with red, and interspersed with large and rather indistinct whitish dots; stalk about an inch long, in a very wide and even cavity; basin nearly even, moderate; flesh fine-grained, compact, with a rich, sub-acid, high and excellent flavor. Keeps through winter. Shoots rather slender, leaves wavy. Productive. Succeeds in New England, New York, and Ohio. This is wholly distinct from the Nonsuch of England, to prevent confusion with which the name Red Canada is preferred. One of the finest table apples, often keeping late in spring. The slender growth of the tree, the frequent scabiness of the fruit, and its moderate crops in some localities, are the chief drawbacks on its value. Fig. 417.

Red Winter Pearmain. (Red Lady Finger, Meigs, Red Fall Pippin, and Red Vandevere of Tennessee.) Size medium, oblong conical; dark purplish red on yellow, with numerous whitish dots; stalk short, cavity narrow; basin small; flesh whitish, very tender and juicy, with a mild, slightly sub-acid, slightly aromatic flavor. Mid-winter. Growth moderate, upright; a regular bearer.

Robey's Seedling. Large, roundish conic; obscurely striped with lively red; flesh yellowish, juicy, with a rich, high flavor. Early winter. Succeeds in Middle and Western States. Tree vigorous and productive.

Rome Beauty.* Large, roundish, very slightly conical; mostly covered with bright red on pale yellow ground; flesh tender, not fine-grained, juicy, of good quality. Ripens early in winter. The large size and beautiful appearance of this new Ohio apple render it popular as an orchard variety. Fig. 408.

Royal Table. Medium, conical, ribbed, greenish yellow, red stripes on yellow side; cavity wide, shallow; basin wide; flesh greenish white, quality good, early winter. Russian.

Russet Pearmain. Size medium, roundish-conical; faint red stripes on greenish yellow ground; flesh juicy, tender, rich, fine sub-acid flavor. Through winter.

Shockley. (Waddel's Hall.) Medium, roundish-oblong, narrowing to the eye; yellow striped and clouded with red, with dark greenish russet blotches; stalk long, slender; cavity narrow, deep; flesh firm, of good but not high flavor. Georgia. Ripens from October to March. Wm. N. White.

Siloam. Medium, oblate, regular, smooth; yellow, with dull red stripes and splashes, dots numerous, small, light gray; basin shallow, regular; eye small, closed; cavity shallow, russeted; stem very short; flesh yellow, juicy, sub-acid, rich, very good. Arkansas.

Skarnishapfel. Medium; flat, conical, ribbed; yellow, flushed and striped with red; cavity and basin shallow and ribbed; flesh firm, sub-acid. Mid-winter. Belongs to Cross apple family, and may prove identical with the Russian Baldwin. Russia.

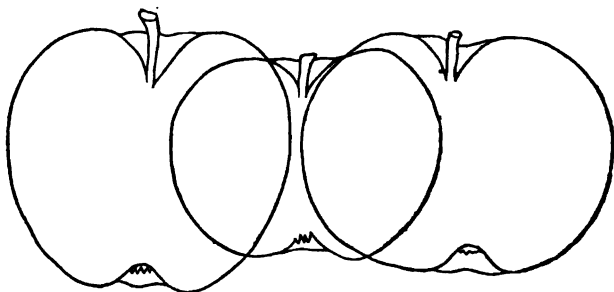


FIG. 409.
Esopus Spitzenburgh.

FIG. 410.—Westfield,
Seek-no-Further.

FIG. 411.
Wagener.

Smith's Cider.* Medium or rather large, roundish-oblong, somewhat flattened at the ends; shaded and slightly striped with light red on pale greenish yellow, with a few conspicuous whitish, yellow dots; stalk slender, cavity rather deep, calyx large; basin shallow, wrinkled; flesh whitish, tender, crisp, with a sub-acid, moderate flavor. Grown in Pennsylvania and the Ohio valley. Valued for its hardiness, productiveness, and handsome fair fruit. Fig. 390.

Spitzenburgh, Esopus.* Rather large, round-ovate, slightly conical; surface a high rich red, rather obscurely striped; stalk three-fourths of an inch long, rather slender; basin shallow, slightly furrowed; flesh yellow, firm, crisp, spicy, rather acid, nearly unequalled in its high rich flavor. Keeps through winter. Shoots ascending and erect, rather slender leaves crenate. Usually a moderate bearer. Fig. 409. Succeeds best in New York, its native State.

Wagener.* Medium, oblate, obscurely ribbed; shaded and indistinctly striped with pale red, and a full, deep red in the sun on warm yellow ground; often streaked with russet; stalk three-fourths of an inch long; cavity wide, rather obtuse; basin even, rather large; flesh yellowish, fine-grained, tender, compact, mild

sub-acid, aromatic, excellent. Ripens through winter. From Penn Yan, N. Y. Fig. 411. Succeeds well at the West. An early bearer.

Wellford's Yellow. Rather small, roundish oblate; faintly streaked with red on pale yellow; flesh yellow, fine-grained, juicy, with a rich, aromatic flavor. Rapid grower, great bearer, and long keeper. Cultivated in Maryland and Virginia.

Westfield Seek-no-Further.* (Connecticut Seek-no-further, New England Seek-no-further.) Medium or large, roundish, often slightly conical; obscurely striped with light dull red, more or less russeted, rarely covered wholly with russet; stalk slender; calyx partly open; flesh tender, rich, spicy, of fine flavor. Early and mid-winter. Tree productive, fruit always fair. Leaves sharply serrate. Fig. 410. Succeeds well throughout the Northern States.

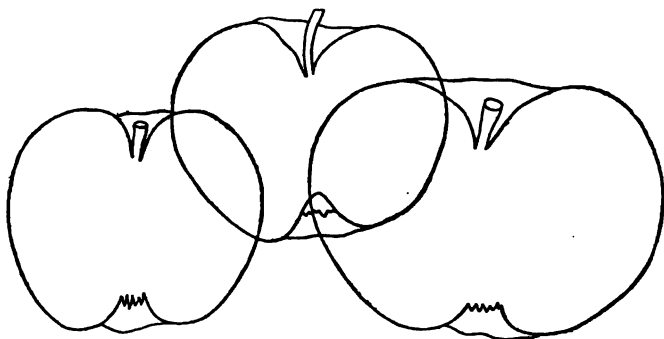


FIG. 412.—Scott's Winter. FIG. 413.—Windsor. FIG. 414.—Wolf River.

Willow Twig.* Large, roundish, slightly conical, obtuse, very regular; greenish yellow, striped and mottled faintly with dull red; stalk short; basin very wide and deep, rim obtuse; flavor sub-acid, or rather acid, not rich. A long keeper. Shoots slender. Cultivated much as a market apple in Southern Ohio. Fig. 414.

Windsor. (Windsor Chief.) Small, oblate; greenish yellow, suffused with red splashes, gray dots; flesh pale yellow, fine-grained, juicy, sub-acid, good. Tree early bearer and prolific. Winter. Wisconsin. Fig. 413.

Wine. (Hays' Apple, Hays Winter.) Rather large, often quite large, roundish, slightly flattened; obscurely striped and mottled with red on yellow ground; stalk quite short; cavity deep, acuminate; calyx large, open; basin large; flesh yellowish white, with a rich sub-acid flavor. Early winter. There are several spurious varieties under this name.

Winesap.* Size medium, round-ovate, slightly conical, sometimes obscurely flattened; color a lively deep red; stalk slender, three-fourths of an inch long; cavity acute; calyx small, in a finely

plaited basin; flesh yellowish, firm, crisp, with a rich sub-acid or rather acid flavor. Keeps through winter. One of the best apples for baking. Growth rather irregular, fruit formerly always fair, of late years more imperfect. Widely cultivated at the West and Southwest. Fig. 405.

Winter Apert. Large, flat, conical; greenish yellow, red striped; cavity deep; basin shallow, ribbed; stem medium; flesh yellowish, firm, sub-acid, good. Season, winter. Russian.

Wolf River. Large, ovate conical, regular, smooth; yellowish white, splashed with bright red, dots large, scattering, light gray; basin shallow, small; eye medium, open, segments reflexed; cavity deep, wide, very russet; stem short, stout; flesh yellowish white, coarse, tender, dry when ripe, sub-acid, not rich, medium quality only. Valuable in the Northwest. Fig. 414. Wisconsin, Winter.

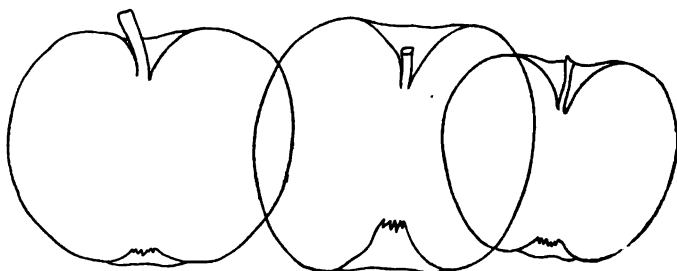


FIG. 415.
Yellow Transparent.

FIG. 416.
York Imperial.

FIG. 417.
Red Canada.

Yacob. Large, oblate, smooth; yellow, striped and splashed crimson, dots few, gray; cavity regular, deep, abrupt, green; stem short, slender, basin deep, calyx twisted, eye small, closed; flesh yellowish white, slightly tinged with red, fine-grained, tender, juicy, sub-acid, spicy, good. Pennsylvania.

Yates. Small, oblate; yellow, covered with dark red stripes, small white dots; flesh yellow, spicy, sub-acid. Great bearer and good keeper. Georgia.

York Imperial.* (Johnson's Fine Winter.) Medium, oblong, angular, oblique, smooth; yellow, shaded red, indistinct red stripes; basin deep, wide; eye nearly closed; cavity deep, narrow, russeted; stem short; flesh yellow, firm, juicy, sub-acid, good. Winter. Pennsylvania. An excellent shipping apple, always brings high prices. Fig. 416.

Section II.—Not Striped.

Antonovka. Roundish oblate; yellow with white bloom; basin deep and cavity acute; flesh yellow, sub-acid, crisp, good. Tree not so hardy as some varieties received from northern Europe which much resemble it in form and fruit. Fig. 419.

Arabsko. Large, conic; green covered with purplish red; cavity medium, stem medium, basin shallow; flesh greenish white, sharp, sub-acid. Winter. Fig. 426. Russian.

Aunt Hannah. Size medium, roundish, approaching ovate; straw color, with a very pleasant mild sub-acid, fine flavor, resembling in character the Newtown Pippin. Origin, Essex County, Mass.

Basil the Great. (Vasilis Largest.) Large, roundish, oblong, unequally truncated, irregular; yellow, mostly covered with dark red and crimson; cavity deep, acute; stem very short; basin wide, deep, abrupt; flesh coarse grained, red next skin, juicy, sub-acid, excellent for culinary use. Very showy apple and is a profitable market one. The trees are said to endure drought without lessening the size of the fruit. Russian. Fig. 346.

FIG. 419.—Antonovka.

FIG. 420.—Iowa Blush.

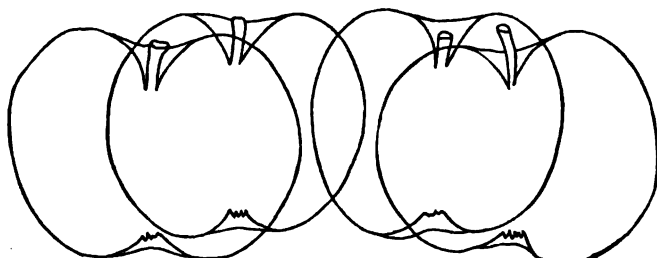


FIG. 418.—Bergamot.

FIG. 421.—Anisovka.

Belle et Bonne. Large, roundish, flattened at ends, obtuse; greenish yellow; stem short; calyx in a wide, deep basin; flesh yellow, tender, large grained, sub-acid, agreeable, and very good. Early winter. A Connecticut apple; a strong growing and productive variety, much esteemed in the neighborhood of Hartford.

Belmont.* Rather large, roundish-conical or ovate-conical, apex usually narrow, but sometimes quite obtuse; faintly ribbed, smooth; color clear pale yellow, with sometimes a light vermilion blush, and rarely with large thinly scattered carmine dots; stalk varying from half an inch long and stout, to an inch or more long and slender; basin in conical specimens, narrow and shallow; in obtuse specimens, narrow and deep, with an obtusely ribbed rim; flesh yellowish white, compact, crisp, becoming quite tender, with a mild, rich, sub-acid, fine flavor. Leaves crenate. Early winter. A profuse bearer. Excellent in New York, Michigan, and Northern and Central Ohio—worthless at Cincinnati. Tender at the West. Fig. 433.

Bergamot. Medium, regular, oblong, cylindrical; yellow with white bloom, has much the appearance of Grimes' Golden; cavity regular, deep; stem very short; basin deep, ribbed; flesh yellow, crisp, sub-acid, good. Fig. 418. Russian.

Boiken. Medium, roundish conic; yellowish green, reddened on sunny side, cavity large; stem short; basin large; flesh white. Season late winter. Fig. 423. Russian.

Brooke's Pippin. Large, roundish, slightly conical; greenish yellow, with a faint blush; stalk short and stout; cavity deep, russeted; basin small, shallow, furrowed; flesh crisp, aromatic. November to March. Productive. Maryland and Virginia.

Bullock's Pippin, or American Golden Russet.* (Golden Russet, Sheepnose.) Rather small, conical; light yellow, sprinkled and sometimes overspread with thin russet; stalk long, slender; basin very small and narrow, ribbed; flesh yellowish white, very fine grained, becoming very tender, with a mild, rich, slightly sub-acid flavor. Growth erect, shoots rather slender; leaves sharply serrate; tree overbears. Early winter. When well ripened, this apple is

FIG. 422.—Longstem. FIG. 423.—Boiken. FIG. 424.—Rosenhager.

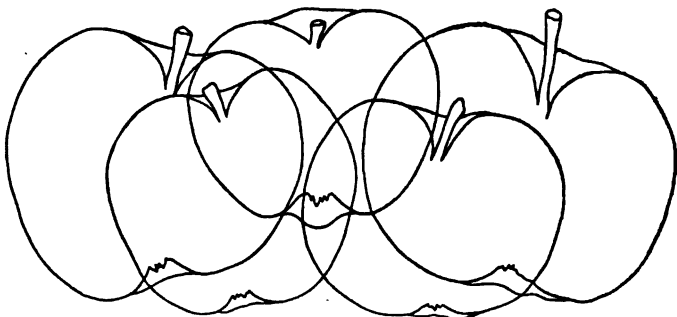


FIG. 425.—Red Queen. FIG. 426.—Arabsko.

exceedingly delicate and tender; sometimes it does not become soft in ripening, when the quality is poor, and often worthless. It is too small to become very popular. Generally rendered worthless at the East by black mildew, and becoming more affected with it at the West. Fig. 366.

Canada Reinette. (Reinette du Canada, Canadian Reinette.) Quite large, somewhat conical and flattened; rather irregular, ribbed, apex obtuse; greenish yellow, sometimes a brown cheek; stalk short, cavity wide; calyx large; basin rather deep, irregular; flesh nearly white, rather firm, becoming quite tender, juicy, with a good, lively sub-acid flavor. Early and mid-winter.

Clarke's Pearmain. Size medium, roundish, slightly conical; skin inclining to rough yellow and russety in shade, light rich red in the sun, thickly dotted with whitish russet; cavity and basin medium; flesh yellowish white, with a very good sub-acid flavor. Tree productive. A well-known Southern variety.

Cumberland Spice. Rather large, varying from roundish conical to long conical, the tapering sides being nearly straight and not rounded; color waxen yellow, with a slight vermilion tinge near the base, and with black specks on the surface; stalk half to three-fourths of an inch long; cavity wide, slightly russeted; calyx open, basin even; flesh yellowish white, breaking, rather light; core hollow; flavor mild sub-acid, with a peculiar and agreeable spiciness, of good quality.

Dansic Pepka. Large, roundish oblong; greenish yellow with blush; cavity very narrow, deep; stem short; basin small, wide, shallow; flesh white, juicy, sub-acid, good. Late winter. Russian. Fig. 427.

English Russet.* (Poughkeepsie Russet.) Medium or rather small, roundish conical, regular; surface more or less overspread with brownish russet on light greenish yellow ground; in large exposed specimens, wholly russeted; stalk one-half to three-fourths of an inch long; cavity moderate, round; basin smooth; flesh green-

FIG. 427.—Dansic Pepka. FIG. 428.—Lead.

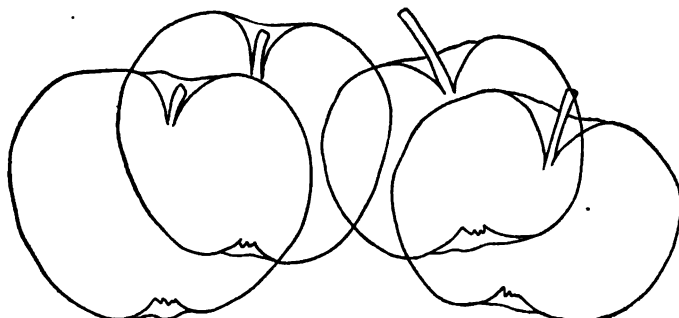


FIG. 429.—Zugoff Winter.

FIG. 430.—Romna.

ish or yellowish white, texture fine, rather firm, with an aromatic, sub-acid flavor. Keeps through spring, and often through summer for twelve months. Growth upright, shoots lively brown. A profuse bearer. A profitable market variety, but of rather poor quality.

Equinately. Fruit large, roundish, slightly oblate; dark red on whitish yellow; stalk short, fleshy; cavity large; basin deep, irregular; flesh yellowish, a little coarse, tender, mild sub-acid, of medium quality. A valued Southern variety.

Fallawater.* (Tulpahocken, Fornwalder.) Rather large, roundish, and slightly ovate-conical, very regular, smooth; color a smooth shade of dull red on light greenish yellow, with a few large whitish dots; stalk slender; cavity narrow, acuminate; basin small; flesh greenish white, fine-grained, with a mild, slightly sub-

acid, moderate flavor. Early winter. A native of Pennsylvania. Although this fruit is of quite moderate quality, its large size and fair appearance render it very popular in Pennsylvania, Ohio, and portions of the West. Fig. 431.

Fulton. Rather large, roundish, flattened at ends, slightly oblique; skin smooth, yellow, often with a handsome blush; stalk rather short, cavity deep; basin large, slightly wrinkled; flesh yellowish, white, fine-grained, with a mild sub-acid flavor. Illinois—valued at the West.

Golden Ball. Large, often quite large, roundish, remotely conical, ribbed; fine yellow; stalk short, slender, with fine green rays or furrows radiating from the centre of the cavity; basin very shallow; flesh tender, rich, aromatic. Ripens late in autumn, and keeps through winter. Liable to vary in size and fairness. Excellent for cooking. Tree very hardy; a poor bearer. Cultivated chiefly in Maine.

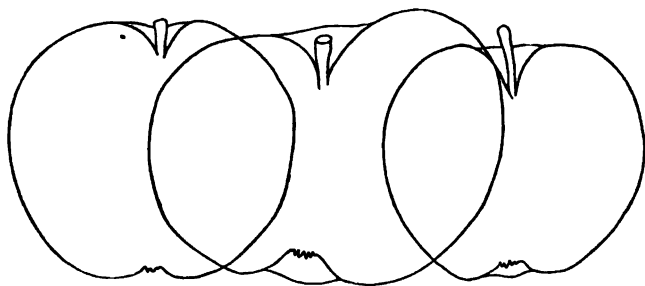


FIG. 431.—Fallawater. FIG. 432.—Huntsman. FIG. 433.—Belmont.

Golden Pippin, of Westchester County. (American Golden Pippin, New York Greening.) Form variable, oblate, globular or conic, ribbed; skin golden yellow; stalk short, deeply set; basin irregular; flesh yellow, tender, juicy, with a rich, refreshing, aromatic flavor. Early winter. Tree spreading—very productive.

Golden Russet.* (Golden Russet of Western New York.) Size medium, roundish, usually a little oblong, sometimes slightly flattened, nearly regular; surface sometimes wholly a thick russet, and at others a thin broken russet on a greenish yellow skin; stem slender, from half an inch to an inch long, being longest on oblate specimens; flesh fine-grained, firm, crisp, with a rich, aromatic flavor. Shoots speckled; tree rather irregular. Keeps through winter. This is distinct from the English Russet, of straight upright growth, and a very long keeper, and from the American Golden Russet or Bullock's Pippin.

Green Seek-no-further. Large, often quite large, roundish, slightly approaching oblong obtuse conical; greenish yellow becoming yellow, specks large and conspicuous; stalk very short; calyx large, basin slightly ribbed, deep; flesh rather coarse, sub-acid, of good flavor.

Grimes' Golden Pippin. Above medium, roundish, slightly oblong, regular; skin yellow, with large russet dots; stalk slender, in a deep cavity; basin deep, slightly wrinkled; flesh of yellowish white, with a mild sub-acid, agreeable, very good flavor. November. Virginia and Ohio Valley.

Hughes. Large, roundish; skin greenish yellow, with a blush; stalk slender; calyx large, open; basin wide, deep; flesh fine grained, tender, with an excellent, agreeable, aromatic flavor. Berks Co., Pa.

Huntsman. (Huntsman's Favorite.) Large, unequal, oblate, smooth; yellow, large distinct dots; stem medium to short, basin wide, deep, eye open; cavity wide; flesh yellow, fine-grained, firm, juicy, sub-acid, rich, very good. Winter. Western. Fig. 432.

Iowa Blush. Medium, conical, regular, smooth; yellow, blushed red on sunny side; cavity regular, deep; stem medium; flesh fine; grained, juicy, sub-acid, good. A seedling originating in Iowa. Midwinter. Fig. 420. Russian.

Kinnaird. (Kinnaird's Choice.) Medium, oblate; yellow, covered with dark red; flesh tender and juicy. Tree vigorous, hardy. Bears young. Tennessee.

Lady Apple.* (Pomme d'Api.) Quite small, regular, flat; a brilliant deep red cheek on light clear yellow; stalk and calyx deep set; flesh tender, delicate, sub-acid, flavor good. A fancy apple. Winter and spring. Shoots small, dark, erect. Productive. Tree rather tender.

Lead. Medium, irregular, oblate; greenish yellow, red blush; cavity acute, stem long, basin very wide, shallow, quality good. Midwinter. Fig. 428. Russian.

Ledenets.* Large, roundish oblate; yellow, with white veinings; cavity regular, basin wide, stem medium; flesh white, sub-acid, juicy. Mid-winter. Russian.

London Pippin. Large or very large, roundish, slightly flattened, obtuse-conical; greenish yellow; stalk very short; calyx large, in a smooth even basin; flesh sub-acid, of a good second-rate flavor. Early winter. Much cultivated in Northern Virginia; and from its large size and handsome appearance sells well in the Washington market. Productive.

Longfield.* Small, medium, round, regular; yellow, blushed pink; cavity narrow; stem large, slender; basin small; flesh white, melting, juicy, sub-acid, quality good. Winter. Fig. 344. Russian.

Lubak Queen. Medium, irregular oblique; white, more or less covered with rosy red; very smooth, polished and waxy; cavity small, acute; stem medium; basin wide, rather shallow; flesh snow white, firm, juicy, sub-acid, very good. Late autumn. Keeps well in cold storage until March. Fig. 347. Russian.

Marshall Red. Large, oblong ovate; bright red all over; acid, good bearer; a cross between Yellow Bellflower and Red June. Does well in the West.

Michael Henry Pippin.* Size medium, roundish-ovate, apex narrow; yellowish green; stalk short, rather thick; basin narrow; flesh yellow, tender, juicy. Growth upright. Through winter. Origin, Monmouth County, N. J. Fig. 434.

Monmouth Pippin.* (Red-cheeked Pippin.) Rather large, roundish-oblata, light greenish yellow, with a fine red cheek; flesh crisp, juicy, mild sub-acid, with a good rich flavor. Keeps through winter. Fig. 369.

Monstrous Pippin. (Gloria Mundi, Ox Apple, Baltimore.) Very large, roundish, somewhat flattened at the ends, slightly angular or ribbed; skin smooth whitish green, becoming whitish yellow; stalk stout, short; calyx large; basin wide, deep, somewhat ribbed, with an obtuse rim; flesh white, tender, rather coarse, sub-acid, not rich. Late autumn and early winter. A good cooking apple.

FIG. 434.—Michael Henry Pippin. FIG. 435.—Lawver.

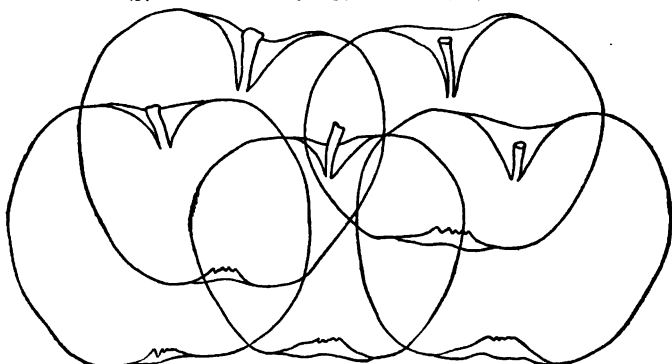


FIG. 436.—Wealthy.

FIG. 437.

FIG. 438.—White Pippin.

White Winter Pearmain.

Newtown Pippin.* (Pippin, Green Newtown Pippin.) Medium or rather large, roundish, oblique, slightly irregular, remotely conical or else a little flattened; dull green becoming yellowish green, often with a dull brownish blush; stalk short, deep set, and surrounded by thin, dull, whitish russet rays; basin narrow, shallow; flesh greenish white, juicy, crisp, fine-grained, with a high, fine flavor. Keeps through spring, and retains remarkably its freshness. Tree of rather slow growth, with a rough bark. The fruit is very liable to black spots or scabs, unless under high, rich, and constant cultivation. One of the best fruits for foreign markets. A native of Newtown, Long Island, and has rarely succeeded well in New England. Tender far West.

Newark Pippin. (French Pippin, of some.) Rather large, round-oblata, regular; greenish yellow, becoming yellow; stalk and calyx deep set; flesh tender, rich, and high flavored. Growth crooked, irregular. Early winter.

Ortley.* (White Detroit, Ortley Pippin, Warren Pippin, White Bellflower, Woolman's Long, Detroit, Jersey Greening, Detroit of the West.) Large, roundish, somewhat oblong-ovate; pale yellow, slightly tinged with pink in the sun; stalk about an inch long; sometimes short, but always slender; cavity deep and narrow; basin rather deep, nearly even or slightly plaited; flesh sub-acid, crisp, sprightly, rich, fine. Shoots slender. This fine fruit has had a high reputation in the Ohio Valley, but it is becoming much affected with the black mildew or scab. Fig. 443.

Peck's Pleasant.* Large, often quite large, roundish, sometimes remotely oblong, often a little oblique, usually slightly flattened; smooth and regular; color light green, becoming yellow, with a brown blush; stalk very short, one-fourth to one-half an inch long, thick, rarely longer and somewhat slender; calyx open, basin abrupt, rather deep; flesh compact, very tender, with a mild, rich, fine, clear sub-acid, Newtown Pippin flavor. Early winter; poor, if too ripe. Growth rather erect. Shoots somewhat diverging. A good bearer; fruit always fair. Fig. 440. Tender far West.

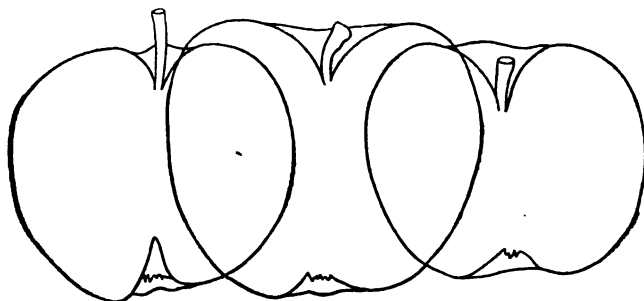


FIG. 439.
Switzer.

FIG. 440.
Peck's Pleasant.

FIG. 441.
Green Mt. Pippin.

Pittsburgh Pippin. (Father Apple, Switzer Apple, William Tell.) Large, roundish-oblate; pale yellow; stalk small, cavity large; basin broad-furrowed; flesh tender, with a mild sub-acid flavor. Early winter. Valued in Pennsylvania. An irregular, spreading grower.

Pomme Grise.* (Gray Apple.) Rather small, roundish-oblate, a gray russet; stalk slender, cavity wide, rather obtuse; calyx small, basin round; flesh very tender for a russet, and fine-grained, rich, and high flavored. Canada. One of the best dessert apples for the extreme north.

Pound Royal. (Pomme Royale, *erroneously*.) Large, sometimes furrowed, roundish, slightly oblong, a little uneven; surface whitish yellow; stalk slender, an inch and a quarter long, cavity large; basin furrowed, irregular; flesh tender, breaking, fine-grained, mild, agreeable, sprightly. Ripens through winter. Tree vigorous, productive. Origin, Pomfret, Conn.

Progress. Rather large, roundish-conical, often slightly oblate; smooth, yellow, often with a brownish cheek; stalk short, cavity russeted; calyx large, basin shallow; flesh crisp, with a pleasant sub-acid flavor. Connecticut.

Red Russet. Large, roundish-conical; yellow, shaded with dull red and deep carmine in the sun; thickly dotted with some rough russet; stalk short and thick; calyx with long segments, basin narrow, uneven; flesh yellow, solid, crisp, tender, with an excellent, rich, sub-acid flavor, somewhat resembling Baldwin. (C. Downing.)

Red Queen. Medium, irregular conical; greenish yellow, red blush on sunny side; cavity small; stem short, stout; basin small; flesh white, green veinings, quite acid. Late winter. Fig. 425. Russian.

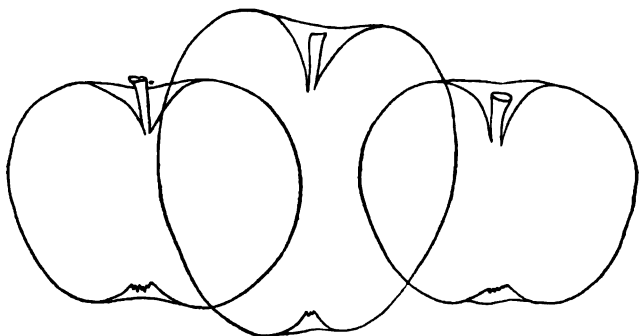


FIG. 442.—R. I. Greening. FIG. 443.—Ortley. FIG. 444.—Arkansas Black.

Rhode Island Greening.* (Greening.) Large, roundish oblate; green, becoming greenish yellow, always fair, a dull brown blush to the sun; stalk three-fourths of an inch long; basin rather small, often slightly russeted; flesh yellow—a rich yellow if much exposed to the sun, and whitish yellow or greenish white if much shaded—tender, juicy, with a rich rather acid flavor. Growth strong, young trees crooked or oblique, shoots rather spreading, leaves sharp serrate; very productive, single trees sometimes yielding forty bushels of fair fruit in favorable years and orchards 500 bushels per acre. Fine in New England and New York. Fig. 442. Tender far West.

Roman Stem. Medium in size, round ovate; whitish yellow, with a faint brownish blush; stalk one-half to three-fourths of an inch long, with a fleshy protuberance at insertion; cavity shallow; basin narrow, slightly plaited; flesh tender, juicy, mild sub-acid, good second-rate flavor. Keeps through winter. A New Jersey fruit which succeeds well throughout the Ohio Valley and Middle States. Hardy far West.

Romna. Medium, oblate; greenish yellow, dull red blush; cavity deep, basin wide, shallow; flesh firm, mild sub-acid, juicy, good. Winter. Fig. 432.

Rosenhager. Medium, round; partly yellow, nearly covered with bright red; cavity medium, deep, stem medium, basin shallow; flesh white, mild sub-acid. Late winter. Fig. 427. Russian.

Roxbury Russet.* (Boston Russet, Putnam Russet of Ohio.) Medium or large, roundish-oblate, remotely conical; partly or wholly covered with rather rough russet on greenish yellow ground, sometimes a dull brown cheek; stalk one-half to an inch long, cavity acute; basin round, moderate; flesh greenish white, rather granular, slightly crisp, with a good sub-acid flavor. Keeps late in spring. Large specimens become conical, with short thick stalks; small specimens are more flat, and with longer and more slender stalks. Growth spreading, shoots downy. Although not of the highest flavor, its productiveness, uniformly fair fruit, and long keeping, render this variety one of the most profitable for orchard culture. It succeeds well throughout the Northern States, but partially fails in a few localities at the West. Fig. 398.

Sandy Glass. Large, regular, oblate; green; cavity acute; basin very wide; shallow, regular; stem short; flesh yellow, firm, sub-acid; quality very good, and best for culinary use. Season, winter. Fig. 388. Russian.

Streintown. Medium, ovoid conical; greenish, blush on side; flesh white. A good cooking apple. Winter. Pennsylvania.

Swaar.* Rather large, roundish, slightly flattened at the ends, often considerably oblate, sides regularly rounded, crown as wide as base; color greenish yellow, becoming a rich yellow, sometimes faintly russeted, and a small blush near the base, when much exposed to the sun; stalk rather slender, three-fourths of an inch long; cavity round, moderate, or often small; basin small, even; flesh yellowish, fine-grained, compact, tender, with a very rich, mild, aromatic, agreeable, slightly sub-acid flavor. Esteemed by some as the finest winter table apple. Ripens through winter and keeps into spring. Shoots ascending, buds large, leaves coarsely rounded serrate. Fruit apt to be scabby on old overloaded trees. Not successful in all localities. Fig. 447.

Tewksbury Blush. (Tewksbury Winter Blush.) Small, round oblate; yellow with a red cheek; flesh yellow, juicy, with a good flavor. Keeps till midsummer. Very productive. New Jersey.

Virginia Greening. Large, oblate; skin yellowish, with large brown dots; stalk and cavity large; calyx open, basin large, abrupt; flesh yellow, coarse, with a rather pleasant sub-acid flavor. A good keeper. Southern.

Western Spy. Large, round-ovate, very regular and even, with a beautiful red cheek on a lemon yellow skin; stem short, in a small cavity; flesh yellowish white, sub-acid of a fine flavor—hardly first-rate. Proved as yet only at the West.

White Pippin.* (Canada Pippin.) Large, roundish, oblong, flattened at ends; light greenish yellow; cavity large; basin abrupt, furrowed; flesh yellowish white, sub-acid. Good, but not very rich. Winter. Fair and productive, valued at the West and Southwest. Fig. 440.

White Rambo. Rather large or medium, roundish-oblate, remotely conical; skin greenish yellow, becoming yellow; cavity large; basin wide; flesh yellowish, with a mild sub-acid, "very good" flavor. Early winter. Ohio.

White Spanish Reinette. (Reinette Blanche d'Espagne.) Very large, roundish, oblong, slightly conical, somewhat angular, ribbed; yellowish green in the shade, rich brownish red next the sun; stalk short, cavity small and even; calyx large, open; basin deep, angular; flesh yellowish white, crisp, flavor rich sub-acid. Growth of tree and fruit resemble that of Fall Pippin, but it keeps longer.

White Winter Pearmain.* Rather large, conical, angular or ribbed; light yellowish green, with a brownish red cheek; stem short; flesh whitish, fine-grained, with a mild sub-acid, rich, fine flavor. This is distinct from the Michael Henry Pippin, which it resembles, and at the West is one of the best and most productive winter apples. Fig. 439.

Winter Cheese. (Green Cheese.) Medium in size, oblate; green in the shade, red in the sun; flesh very crisp, very tender and delicate, sprightly, and of a fine, pleasant flavor. One of the most highly esteemed early winter apples of southern Virginia, closely resembling the Fall Cheese, but a longer keeper. Becomes mealy and insipid after maturity.

Winter Pippin of Geneva. Large, oblate, slightly angular; yellow, with crimson cheek sparsely covered with gray dots; stalk small, cavity narrow; calyx open, segments long; basin open; flesh yellow, tender, vinous, excellent. Ripens through winter. Tree and fruit resemble Fall Pippin. (C. Downing.)

Wood's Greening. Large, roundish, little oblique, slightly flattened, obscurely conical; pale green, smooth; stalk very short, cavity acuminate; calyx rather large, basin distinct, slightly plaited; flesh greenish white or nearly white, fine-grained, slightly crisp, tender; flavor very agreeable, mild sub-acid, first-rate, but not very rich.

Yellow Bellflower.* (Bellflower, Yellow Belle Fleur.) Large, often quite large, oblong-ovate, apex quite narrow and conical, more or less irregular; surface pale yellow, often with a blush; stalk slender; basin ribbed; seeds long; flesh very tender when ripe, fine grained, crisp, juicy, acid, becoming sub-acid, excellent. keeps through winter. Shoots yellowish, rather slender; growth of the tree rather upright; succeeds best on rather light soils. Adapted to the climate of the Northern and Middle States, as far south as Kentucky, but fails by premature dropping in many localities. More tart and less rich in cold summers, and far North. Hardy at the West. Fig. 448.

Yellow Newtown Pippin.* Medium, or rather large, roundish, oblate and oblique, more or less flattened; yellow, with a brownish red cheek, purplish before ripe; stalk very short; flesh firm, crisp, with a rich, mild flavor. Closely resembles the Green Newtown Pippin, and believed by many to be identical, differing only by a warmer exposure. It is fairer in some localities than the Green, but is usually inferior to it in flavor. C. Downing gives the following distinguishing points between these two sub-varieties: "The Yellow is handsomer, and has a higher perfume than the Green, and its flesh is rather firmer and equally high flavored; while the Green is more juicy, crisp, and tender. The Yellow is rather flatter, measuring only about two inches deep, and it is always quite oblique—projecting more on one side of the stalk than the other. When fully ripe, it is yellow, with a rather lively red cheek and a smooth skin, few or none of the spots on the Green variety, but the same russet marks at the stalk. It is also more highly fragrant before and after it is cut than the Green. The flesh is firm, crisp, juicy, and with a rich and high flavor." Fig. 449.

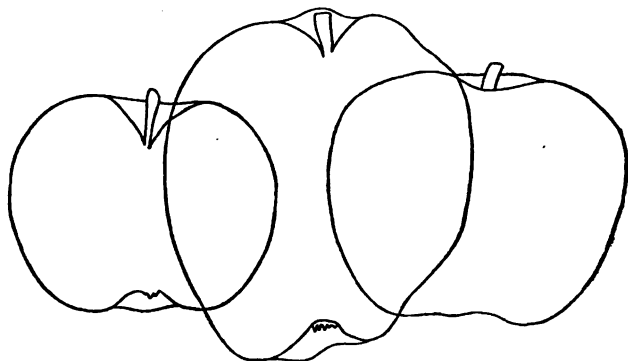


FIG. 445.
Swaar.

FIG. 446.
Yellow Bellflower.

FIG. 447.
Yellow Newtown Pippin.

Yellow Transparent. Medium, round; yellow, almost transparent; basin shallow, regular; cavity acute; flesh crisp, sub-acid. Moderately hardy. This is a numerous family, of which a number of sorts have been imported from Northern Europe, varying somewhat in shape and size, and in cases colored with red blushes. Fig. 417.

Zukoff's Winter. Large, irregular conical, greenish, nearly covered with dark red; cavity medium, basin small; flesh white, sub-acid, juicy, quality good. Mid-winter. Fig. 429. Russian.

DIVISION IV. CRAB APPLES.

Crabs belong to an entirely distinct branch of the Apple family, the type of the former being the well-known Siberian Crab, *Pyrus baccata*, while all our common apples are varieties of *Pyrus malus*. Hybrids of the two are freely produced, and of recent years many new sorts have been introduced, some of divided merit and beauty. The common idea concerning Crab apples is that they are pretty miniature apples of more or less astringency and fit only for making jellies and preserves. The following descriptions show that they vary from less than one to over two inches in diameter—that they are sweet, sub-acid, acid, and bitter. It is probable their great hardness will make the choicer varieties valuable for cultivation in the extreme North.

Cherry. Very small, round oblate; light yellow, red blush, dots small; stem very long, slender; cavity narrow, shallow; calyx small; basin narrow, very shallow. Flesh yellow, juicy, sub-acid astringent. August. Fig. 451.

Dartmouth. Medium, crimson and orange, with a light brown, handsome, sub-acid. Tree vigorous and productive. Late.

Florence. Large, very handsome, hardy dwarf. Bears early and profusely. Western.

Gibb. Large, round oblate; bright orange yellow, flushed in sun; stem short, thick; cavity wide, deep; calyx medium, open; basin very wide, shallow, ribbed; flesh deep yellow, firm, crisp, juicy, sub-acid. Tree vigorous, hardy, and productive. One of the best. Autumn. Fig. 449. Wisconsin.

Gideon. Large, oblate conical; light yellow; stem long, slender; basin narrow, shallow; calyx medium; cavity narrow, deep; flesh yellowish white, tender, juicy, sub-acid, good. Autumn. Fig. 450. Minnesota.

Hyslop. Large, round; in clusters; bright, deep crimson, blue bloom, sub-acid, handsome. Tree very hardy and vigorous. October.

Hewes. *Cider Crab*. Small, round, dull red, juicy, acid. Good for cider only.

Lady. (*Lady Elgin*). Rather large, whitish and red, juicy, sub-acid. Late.

Lady Finger. Large, oblong ovate, ribbed; light yellow, covered with bright red; stem long, slender; calyx small; basin narrow, shallow; flesh yellowish, tender, juicy, brisk acid, good. Late autumn. Fig. 452. Kansas.

Looker Winter. Large, yellow with red cheek; juicy, sub-acid. Late keeper.

Martha. A seedling from Minnesota, said to be very vigorous, hardy, and productive. October.

Marengo. Medium, round; yellow, bright red over; crisp, sub-acid. Keeps all winter.

Montreal Beauty. Large, round, obovate; bright yellow, shaded red; flesh yellowish white, firm, acid. Excellent. Tree a free grower and very ornamental. October.

FIG. 450.—Gideon.

FIG. 448.—Orange.

FIG. 452.
Lady Finger.

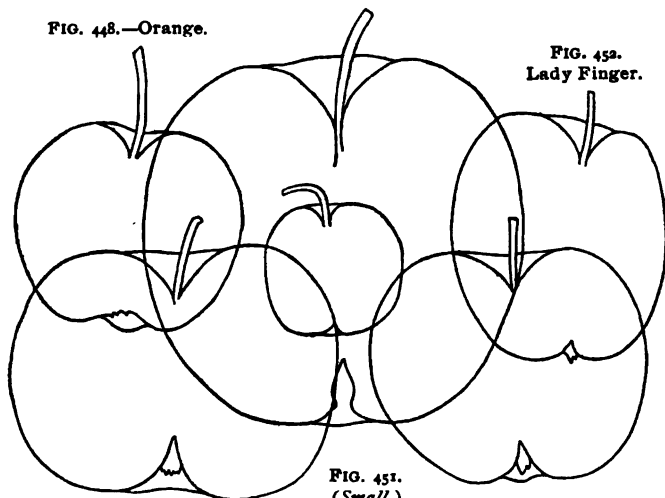


FIG. 449.—Gibb.

FIG. 451.
(Small.)
Cherry.

FIG. 453.—Van Wyck.

(Figures are natural size.)

Orange. Very large; flesh crisp and juicy. Tree a slow grower, free bearer. Ripens late. Fig. 448.

Paul's Imperial. Medium, yellow, nearly covered with bright red, acid. Ripens early. Tree vigorous.

Quaker Beauty. Large, in clusters, yellow, with crimson cheek. Tree a strong grower, hardy, productive. West. Winter.

Queen's Choice. Medium, round; bright crimson; flesh white, brisk flavor, handsome. Tree vigorous and prolific. Ornamental.

Red Siberian. Small, about an inch in diameter, round, yellow, one side scarlet. A free-growing, handsome tree, but the fruit not so good for culinary purposes as larger varieties.

Richland Sweet. Large, conical, bright red, juicy, sweet, and rich. Tree a handsome grower and profuse bearer; does not blight. Winter.

Snyder. Large, oblate conical; yellow, splashed and striped carmine; dots medium, yellow; flesh yellowish, juicy, sub-acid. September. Wisconsin.

Sweet Russet. Large, round, inclined to conical, yellow russeted.

Sylvan Sweet. Very large, bright red, tender, juicy, and sweet. Wisconsin.

Transcendent. Large, round obovate; yellow striped with red; flesh crisp, juicy. Tree vigorous and productive. Said to blight badly. October.

Van Wyck. (*Brier Sweet.*) Large, round conical; regular whitish, shaded light red; dots small; stem long; basin medium, shallow; cavity narrow, deep, russeted; flesh yellowish, very sweet, moderately juicy, good. Autumn. Fig. 453. New York.

Whitney. Medium, handsome, rich, good. Very hardy. Illinois.

Yellow Siberian. Medium, round, golden yellow. Vigorous grower. Ripens in September.

CHAPTER XVIII.

THE APRICOT.

It is remarkable that a fruit of such excellence as the apricot, and ripening from one to two months before the best early peaches, should be so little known. In its natural character, it is more nearly allied to the plum than the peach, resembling the former in its broad leaf, and in the smooth stone of its fruit; but downy like the peach, and partaking largely of its flavor and excellence.

The apricot is budded on seedling apricots, and on peach and plum stocks. Plum stocks are preferred, and are more especially adapted to heavy soils; on light soils the (hard-shelled almond) and the wild plum have proved excellent.

The soil should be deep and dry. Young trees have frequently perished from a wet sub-soil, even where the surface is not unusually moist. On suitable soils, the tree is as hardy as most early peaches, but its greatest drawback is that its blossoms open so early, and the young fruit is so tender that they are both destroyed by frost. The trees have been commonly planted in the warmest situations, as on the warm side of buildings, or other sheltered site, facing the hot sun, where they have blossomed early, and, as a consequence, the crop has not unfrequently been destroyed by vernal frosts. Hence, a northern or more exposed aspect would be far preferable. If trained on a building, the eastern side should be especially avoided, as a hot morning sun upon frosted buds would be nearly certain destruction.

The liability to the attacks of the curculio, and the very common destruction of the whole crop by this insect, have contributed to the general conclusion that the apricot is not suited to our northern climate. Several cultivators, as far north as forty-three degrees of latitude, by a systematic destruction of

this insect, and by selecting a dry sub-soil, are said to obtain heavy crops of this delicious midsummer fruit.

More recently varieties from southern Russia have been introduced, which, so far as hardiness and vigorous thrifty growth are concerned, appear to have advantages over the older kinds in cultivation. But thus far in producing satisfactory crops of fruit for market purposes, apricots east of the Rocky Mountains neither North nor South have been very successful.

By careful management, of which it is surely worthy, sufficient for family use may be obtained wherever the fruit will grow, but that apricots may be expected to be about as productive as the peach, as one prominent authority has recently stated, unless indeed in a few favored localities, is hardly probable. The following varieties are the most worthy of cultivation:

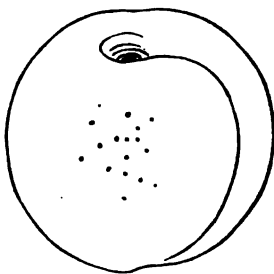
VARIETIES.

Alberge. (Albergier-Alberge de Montgamet.) Small, roundish, slightly compressed; deep yellow; flesh reddish, firm, with a rather brisk flavor; stone compressed. Rather late. Leaves with stipules. For preserving.

Alexander. Large, oblong, orange yellow, spotted red, sweet, juicy, early. Very good. Prolific. Russian.

Alexis. Large, yellow, red blush, sub-acid, rich and good. Does well in West. Ripens about July 15th. Russian.

Black. (Purple Apricot, Noir, Violet.) Small or medium, round; pale red where densely shaded, dull deep purple or nearly black in the sun; surface with a thin down; flesh red near the skin, yellowish at the stone, somewhat fibrous, sweet, slightly astringent, with a pleasant, good flavor. Kernel sweet; adheres to the stone. Hardy as an apple-tree, and very productive. A distinct species (*A. dasycarpa*) from the other apricots. Ripens with the Breda. Reproduces itself from the stone. Shoots quite slender, greenish. There is another quite different apricot, called Violet or Red Angoumois; small, oblong, lighter red, free from the stone. Rare.



Breda.* (Holland, Amande Aveline.) Rather small, sometimes nearly medium (an inch and a half diameter), roundish, obscurely four-sided, suture distinct; surface orange, with a dark reddish

FIG. 454.—Breda.

orange cheek; flesh deep orange, free from the stone, rich, and high flavored. Sweet kernel. Quite early, or a week or two after midsummer. Hardy for an apricot, and very productive. Fig. 454.

Brussels. Size medium, rather oval, compressed; pale yellow, dotted white in the shade, russety brown to the sun; suture deep at base; flesh yellow, rather firm, moderately rich. Rather late.

Budd, J. L. Large, white with fine red cheek; sweet, juicy. Very good. Ripens in August. Russian.

Burlington. Rather large, oblong, suture distinct; skin golden yellow, dotted red, and a blush to the sun; flesh yellowish, sweet, good. Last half of July. New Jersey.

Dartmouth. Medium, an inch and a half in diameter, round; dark crimson and orange, with light bloom. Quality very good. Tree a free grower.

Early Golden.* (Dubois' Apricot.) Small, an inch and a fourth in diameter, round-oval, nearly smooth; suture narrow, distinct; surface wholly pale orange; flesh orange, moderately juicy, sweet, good, free from the stone. Kernel sweet. Early, or ten days before the Moorpark. Hardy, very productive, profitable for market. Origin, Dutchess County, N. Y.

Early Moorpark. Small, round, compressed, good. Ripens about first of August.

Gibb.* Medium, yellow, sub-acid, juicy, rich. Ripens middle of June. Best early sort. Russian.

Harris. Medium, roundish oval, flattened, suture distinct, bright yellow, red cheek, juicy, good. Hardy, productive. Ripens middle of July to first of August. New York.

Hemskirke. Large, roundish, compressed; surface orange, with a red cheek; flesh bright orange, rich, juicy, sprightly. Kernel bitter. Stone rather small. Resembles Moorpark, but smaller, a little earlier, and stone not perforate. English.

Lafayette. Very large, oval, light yellow, marbled red in the sun; flesh high flavored and excellent. Ripens in August.

Large Early. Size medium, oblong, compressed, suture deep, slightly downy; pale orange, with a spotted bright orange cheek, very handsome; flesh free from the stone, pale orange, rich, juicy. Ripens at or a little before midsummer. Fig. 455. South of France.

Moorpark.* (Anson's, Dunmore's Breda, Temple's.) Large (two inches in diameter), nearly round, slightly compressed; surface orange, with a deep orange-red cheek, and with numerous darker dots; flesh free from the stone, bright yellowish orange, rather firm, quite juicy, with a rich, high flavor. Kernel bitter. Stone perforate, or with a hole lengthwise under one edge, so that a pin may be thrust through. Season medium, or two weeks after midsummer. Requires the shortening-in pruning recommended for the peach. English. Old.

Musch. (Musch-Musch.) Rather small, round, deep yellow, with a slight orange-red cheek; flesh yellow, translucent, tender, sweet. Tree rather tender. Little known in this country. Origin, Musch, in Asia Minor.

Orange. (Early Orange, Royal Orange, Royal George, Persian, Royal Persian.) Size medium, roundish, suture distinct, deep at base; surface orange, often a ruddy cheek; flesh dark orange, half dry, partly adhering to the stone—dry and poor unless house ripened. Stone small, roundish. Kernel sweet. Culinary. Ripens at midsummer.

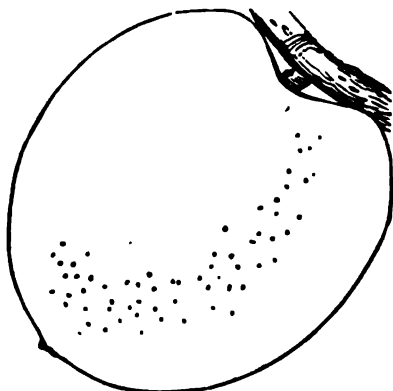


FIG. 455.—Large Early.

Peach.* (Anson's Imperial, Pêche, De Nancy.) Very large, slightly larger than Moorpark, roundish; yellowish orange, with a brownish orange cheek, and mottled with dark brown to the sun; flesh rich yellow, juicy, with a rich, high flavor. Kernel bitter. Stone perforate. Ripens about the time of the Moorpark, which it closely resembles, but is of larger size. Origin, Piedmont.

Red Masculine. (Early Masculine, Brown Masculine, Abricotin, Abricot, Precoce, Abricotier Hatif.) Small, nearly round, suture distinct; bright yellow, with deep orange cheek and red spots; flesh yellow, slightly musky, sub-acid. Stone thick, obtuse at ends. Kernel bitter. Flowers rather small. Very early or about midsummer. Hardy for an apricot. Valuable only for its earliness.

Ringgold. Large, roundish, slightly oblong; light orange, darker in the sun; flesh yellow, juicy, excellent. Ripens soon after the Orange. Georgia.

Roman. (Abricot Commun.) Medium in size, rather oval, compressed, suture small or obscure; surface pale yellow, with a few red dots to the sun; flesh very fine grained, half juicy, with a mild pleasant flavor. Kernel bitter. Worthless in England, but greatly improved by our warm summers. Productive. Season rather

early or medium, or two weeks after midsummer. It is disseminated in this country under various erroneous names.

The Blotch-leaved Roman differs only in the yellow spot or stain of its leaves.

Royal. Rather large, round-oval, slightly compressed, suture shallow; dull yellow, faintly reddened to the sun; flesh pale orange, firm, juicy, sweet, high flavored, slightly sub-acid, free from the large, oval, nearly impervious stone. Kernel bitter. Ripens a week before Moorpark, smaller than the latter, and with a less bitter kernel. French.

Shipley's. (Blenheim.) Large, oval, surface orange; flesh deep yellow, juicy, rather rich. Stone roundish, not perforate. Kernel bitter. Inferior to Moorpark, but rather earlier. English.

Texas. Small, round, dark maroon; flesh juicy and pleasant, astringent at stone; clingstone. Athens: Ga.

Turkey. Size medium, round, not compressed; surface deep yellow, with a mottled, brownish, orange cheek; flesh pale yellow, firm, juicy, with a fine mixture of sweet and acid; very free from stone. Rather late, or middle of August. Somewhat resembles Moorpark, but differs in being rounder, paler, with an impervious stone, and sweet kernel.

The Blotch-leaved, or Golden Blotched, is identical with the preceding, with a yellow spot on the centre of each leaf.

Turkish of Western New York. Large, oval, compressed, orange-yellow shaded red. Productive. This is undoubtedly a different variety from the old Turkey.

White Masculine. (White Apricot, Early White Masculine, Abricot Blanc.) Small, roundish; nearly white, rarely a faint reddish cheek, rather downy; flesh white, delicate, a little fibrous, adhering to the stone. Kernel bitter. Closely resembles the Red Masculine, except in color and being rather better, and four or five days later.

CHAPTER XIX.

THE BLACKBERRY.

THE Blackberry requires nearly the same treatment as the Raspberry; but being more a rampant grower it should have more room, and needs more pruning or pinching. The distances of the rows may be six to eight feet apart, and the plants, if kept single, two feet in the row. Sometimes they are allowed to grow thickly or in a continuous line, in which case they should be kept well cultivated and properly pruned.

Constant cultivation is always better than much manuring.

Pruning the blackberry is commonly but little understood. We hear complaints of the rambling and straggling growth of



FIG. 456.



FIG. 457.

this bush, extending across alleys, tearing dresses, at the same time proving unproductive. This is owing to a neglect of summer pruning. As soon as the new shoots have reached two and a half or three feet in height, the ends should be pinched off with the thumb and finger, which will cause the protrusion of laterals. These in turn are to be pinched off when they have grown from twelve to eighteen inches. It will be necessary to pass along the rows every two weeks in doing this work, as new shoots will be constantly thrown out during the entire summer. The plants being thus kept within bounds, will present the neat, compact, and productive bushes

shown in Fig. 456, instead of the unproductive stragglers, if left untouched, represented by Fig. 457.

COVERING BLACKBERRIES.—The following mode of covering is described in *The Country Gentleman*, by Amos Fish, of Bethlehem,

N. Y., and is adapted to cold regions:

"At the approach of winter remove the stakes and lay the bushes at right angles from the rows, flat on the ground, and cover them two or three inches deep with earth, as follows: Cut off the limbs within one and a half inches of the canes, at the right and left hand sides of the row, making flat bushes. 'Shorten in' the remaining limbs by cutting off the slender ends; then, with a digging or dung fork, loosen the earth about the roots, and remove some, laying the roots loose on one side, so that in laying down the roots shall be bent instead of the canes



FIG. 458. — Ancient Briton Blackberry. (See Index.)

being broken. When laid down use bricks to hold them down while covering, and remove the bricks when in the way. The bushes should be raised up and the stakes replaced as early in the spring as the frost is out of the ground, which can be easily done with a fork if the rows are laid down singly instead of lapping over one another."

VARIETIES.

Agawam. Medium to large, bright black, juicy, sweet; flavor moderate. Canes generally stout, sometimes drooping. Productive, hardy, suckers freely.

Dorchester.* Rather large, oblong (sometimes an inch and a fourth long), nearly sweet, color shining black. It bears carriage well. Vigorous, hardy, and productive, ripening at the North the first of August. Fig. 459. Massachusetts.

Early Harvest. Rather small, tender, very juicy, sweet, very good. Canes red, moderately vigorous; thorns few, small. Good.

Erie. Medium, nearly globular, not very sweet. Canes vigorous, upright, branched, green tinged with red. Winter kills.

Kittatinny.* Large, sometimes an inch and a half long, oblong ovate, glossy black; flesh moderately firm, nearly sweet, rich, excellent. Canes very vigorous. Quite hardy, very productive, rip-



FIG. 459.—Dorchester.



FIG. 460.—Kittatinny.

ening at the North early in August. The best family blackberry. The berries become duller in color after picking and less showy in market. Fig. 460.



FIG. 461.—Lucretia Dewberry.



FIG. 462.—Loganberry.
(See Index.)

Lucretia Dewberry.* Large, coreless, glossy black, juicy, sweet; ripens a fortnight earlier than Wilson's Early. Vine vigorous, procumbent, thorny, hardy, but does better if lightly covered in winter. The best dewberry as yet introduced. Fig 461.

Minnewaska. Medium, nearly round, juicy, sweet. Canes branched, shaded red, thorny. Winter kills. Late.



FIG. 463.—Snyder.

Missouri Mammoth. Large, black, firm, sweet. Hardy, productive. Not entirely hardy north of New York. Missouri.



FIG. 464.—Wilson's Early.

Newman's Thornless. Rather large, oval, quality very good. Canes of moderate growth, nearly free from spines. Early August. Sometimes productive, usually not. Ulster County, N. Y.

New Rochelle.* (Lawton.) Large, oblong oval, black, soft and sweet when fully ripe. Middle of August. Canes tender in severe climates. New Rochelle, N. Y.

Snyder.* Medium, oblong oval, juicy, sweet, fine flavor. Canes strong, upright, thorny. Very productive and extremely hardy. Valuable. Fig. 463.



FIG. 465.



FIG. 466.

Wilson's Early.* Very large, oblong oval, black; quality moderate. Canes tender at the North, hardy as far south as Philadelphia, where it is very productive, and the most showy and profitable of all blackberries. Early. Fig. 464. New Jersey.

Wilson, Jr. Medium to large, very juicy, good. Canes moderately vigorous, thorny. Good in New Jersey and South. Winter kills north of New York.

CHAPTER XX.

THE CHERRY.

PROPAGATION.—The cultivated varieties of the cherry consist of two distinct classes of sorts; the first, comprising the Mazzards, Hearts, and Bigarreaus, is characterized usually by the tall, upright growth and pyramidal form of the tree, by the large, vigorous, and straight young branches, and by a sweet or bitter, but not a sour taste. The second class, or round-fruited, including the Dukes, Morelloes, and the common pie cherry, has small, irregular, and thickly growing branches, and a decidedly acid fruit. Observation will soon enable any one to distinguish these two classes, even where the trees are not more than a foot in height. It is the former only that are commonly used as stocks for grafting and budding, on account of their straight and rapid growth. Attempts are not unfrequently made to propagate the common cherry on the wild Black Cherry (*Cerasus Virginiana*), or on the Choke Cherry (*C. serotina*). Such attempts prove to be failures, the sorts being too dissimilar in their natures to favor union. These two species, it will be observed, have racemose inflorescence, while in the cultivated cherry the flowers are simply in fascicles or umbels. Some of the wild species (as the Sand Cherry, *C. pubescens*), having the latter kind of inflorescence, have been successfully used as stocks, and their adoption might possibly prove useful at the South and West, where the Heart cherries fail.

The stones, as soon as they are taken from the fruit, should be dried only enough to prevent mouldiness, and then mixed with an equal quantity of clean moist sand. This will preserve a proper degree of moisture, and allow the easy separation of the stones in planting. The best way to keep them till spring is to bury them in shallow pits on a dry spot of

ground, covering them with flat stones and a few inches of earth.

The seed may be planted in autumn or spring. If in autumn, the ground should be dry, and entirely free from all danger of becoming flooded or water-soaked. Unless the soil is quite light, the surface should be covered with leaf mould or pulverized manure, to avoid the formation of a hard crust upon the surface, which would prevent the young plants from breaking through. But usually spring is the best season, if the planting is done the moment the frost is out of the ground; for the seeds sprout and grow on the first approach of warm weather. The distance should be the same as for the peach and apple; and nearly the same directions are applicable to their management in the nursery rows.

Good seedlings, averaging a foot and a half high, may be transplanted from the seed-beds when a year old, and if well cultivated in good soil, may be budded the same season. Where the buds fail, the trees may be grafted in the following spring.

Budding can only succeed with thrifty, freely growing stocks and with well-matured buds. About the time, or a little after the most vigorous stage of growth, or just as the terminal buds on the shoots *commence* forming, is the best period. If earlier, the buds will usually be too soft; if later, the bark will not peel freely, nor the buds adhere well. This period usually commences about midsummer, and continues, under the various influences of season and soil, for two or three weeks, and sometimes more than a month. Success will be found to depend also upon cutting out with the bud a larger portion of the wood than is common with other budding, or equal to one-third the diameter of the shoot. This will be found particularly useful where the buds are slightly immature, retaining in them a larger portion of moisture, and preventing their curling off from the stock.

Difficulty is often experienced in successfully grafting the cherry. It succeeds well, if performed very early in the spring, before the slightest swelling of the buds, and before the frost has disappeared from the ground. After this period it is very liable to failure.

In propagating the slower-growing, sour-fruited varieties,

good trees are often soonest obtained by grafting or budding them at standard height on large straight stocks. If grafted, they soon form a handsome head; if budded, care must be taken by judicious pruning to prevent the young shoots from growing all on one side.

Pruning the cherry, except to form the head, is rarely needed.

SOIL.

The cherry being a very hardy tree, will thrive in the Northern States in nearly all good soils. But a dryer soil than for most other species is found preferable; a sandy or gravelly loam is best. In wet places, or on water-soaked sub-soils, it does not flourish, and soon perishes.

DWARF CHERRIES.

These are, as yet, cultivated to a limited extent in this country. They are chiefly adapted to village gardens, or other grounds of limited extent, as they may be set as near each other as five or six feet. They may be easily covered with netting, and thus protected from the birds; and what is most rare and desirable, the fruit permitted to remain until fully ripe, so important to the flavor of all cherries of an acid character.

The stocks used for this purpose are the Mahaleb (*Prunus Mahaleb*), which also possesses the advantage of flourishing on heavy clay ground. The buds usually grow quite vigorously, their branches being so pruned that seven, nine, or more may come out from the centre of the plant, like a well-managed gooseberry bush. These branches will put forth early in summer, as in pyramidal pears, several shoots at their extremities, all of which must be pinched off to within two or three buds of their base, leaving the leading shoots untouched till near the close of summer, when they must be shortened to eight or ten buds. The Heart and Bigarreau cherries may be left of one-half greater length than the Dukes and Morelloes, which are of smaller habit of growth; and where the ground is small, the trees may be root-pruned and kept within a very limited space.

The cultivation of dwarf cherries would greatly facilitate the use of net screens for covering entire orchards, as sometimes practised in Holland and England. The boundary fence is made of wire (or wood) lattice, so as to exclude small birds. At regular distances, through the inclosed area, are inserted into the earth wooden or tile sockets for the reception of poles or props to support the net. These poles have each a small circular board nailed on their tops, to prevent injury to the netting. The boundary fence is supplied with hoops, to which the net is readily attached. When the cherries begin to ripen, it is elevated on several of the poles, each carried by a man, and spread over the garden, the rest of the poles being easily inserted in their sockets afterward. All birds are thus completely excluded. During rain or dewy evenings, the net is stretched to its utmost extent. In dry weather it is slackened, and forms a festooned vault over the whole cherry garden. Its durability is increased by soaking it in tan once a year. Ten square rods of ground, comprised within a circle of fifty-nine feet in diameter, would contain forty dwarf cherry-trees at eight feet distance, or ninety trees at five feet distance.

Sometimes the cherry crop is much lessened by long and *heavy rains*, at the period of the bursting of the anthers, washing down the pollen, and preventing the fertilization of the stigma and germ.

At the South and West the finer varieties of the Heart and Bigarreau cherries do not flourish. This is supposed to be caused by the hot sun upon the bark of the trunk, and by rapid growth preventing a sufficient hardening of the wood. The Mayduke, Early Richmond, and the Morelloes generally succeed well. Grafting the Heart varieties upon these hardy sorts has been found useful, and training the trees with low heads, or with but little bare trunk, is an additional security. The cracking and bursting of the bark at the West are partly prevented by these precautions; but the safest way is to confine the culture of this fruit to the sorts above named, which are least affected. Cherries of any kind are unsatisfactory in the Southern States, those only which are grafted upon Mahaleb stock giving any satisfaction.

SYNOPSIS OF ARRANGEMENT.

CLASS I. FRUIT HEART-SHAPED.

(Fruit inclining to sweet, tree vigorous and regular in growth.)

Heart and Bigarreau Cherries.

Section I. Fruit black, dark red, or crimson.

Section II. Fruit bright red, or lighter.

CLASS II. FRUIT ROUND.

Duke and Morello Cherries.

Section I. Fruit black, dark red, or crimson.

Section II. Fruit bright red, or lighter.

CLASS III.

Native Dwarf Cherries.

CLASS I. FRUIT HEART-SHAPED.

*Section I. Fruit black, dark red, or crimson.***Afghanistan.** Large, black, sweet; flesh firm; good shipper. Tree vigorous. Prolific South.**Black Eagle.*** Rather large, obtuse heart-shaped, roundish, nearly black; stalk an inch and a half long, rather slender, slightly sunk; flesh dark, deep purplish crimson, with a very rich, high, excellent flavor. Season medium (1st of July). Shoot stout, diverging or spreading. A cross of the Graffion and Mayduke. English. Not always of the highest character. A moderate bearer. Fig. 471.**Black Hawk.** Large, heart-shaped, often obtuse, sides compressed, surface uneven; color purplish black, glossy; flesh dark purple, rather firm, rich, high flavored. Last week of June. Dr. Kirtland, Cleveland, Ohio.**Black Heart.** Medium or rather large, heart-shaped, slightly irregular; blackish crimson, becoming black; stalk an inch and a half long, moderately sunk; tender when ripe, with a high, "very good" flavor. Season medium, or rather early. Productive and hardy; growth rather erect, or with diverging shoots.

Davenport, or **Davenport's Early**, closely resembles **Black Heart**, but is a few days earlier, and the leaves are larger and lighter green.

FIG. 467.
May Bigarreau.

FIG. 468.
Knight's Early Black.

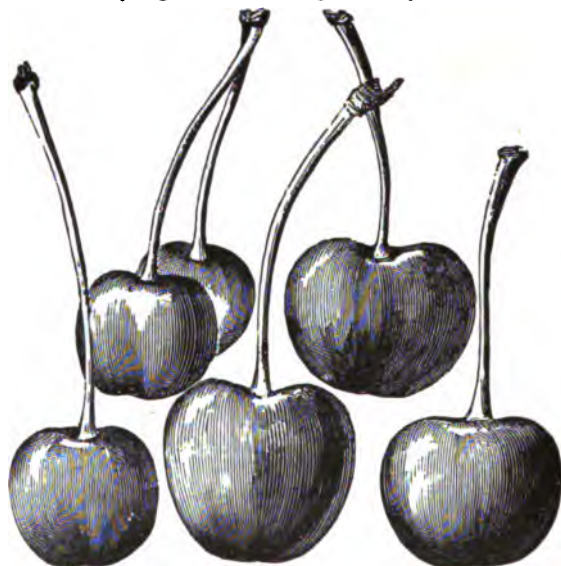


FIG. 469.
Early Purple Guigne. Black Tartarian.

FIG. 470.

FIG. 471.
Black Eagle.

Black Tartarian.* (Frazer's Black Tartarian, Black Circassian, Black Russian, Ronald's Large Black Heart, Ronald's Heart.) Quite large (often an inch in diameter), on crowded old trees only medium; heart-shaped, often rather obtuse, surface slightly uneven; nearly or quite black; stalk an inch and a half long, slightly sunk; flesh dark, half tender, with a peculiar liver-like consistency, rich, nearly destitute of acid, with a very fine, mild flavor. Ripens early, or about the middle of June. Shoots very erect. The vigorous growth and great productiveness of the tree, and the large size and mild, sweet flavor of the fruit, render this variety a general favorite. Fig. 470.

Brandywine. Rather large, broad heart-shaped; crimson, mottled; flesh tender, slightly sub-acid, very good. Last of June. Origin, Wilmington, Del.

Brant. Large, heart-shaped; reddish black; flesh dark purplish red, sweet, half tender, juicy, rich. Middle of June. Cleveland, Ohio. Dr. Kirtland.

Conestoga. Large, obtuse heart-shaped; dark purple; stalk long, slender; flesh firm, with a rich, pleasant flavor. Lancaster County, Pa.

Cumberland's Seedling. (Triumph of Cumberland.) Large, obtuse heart-shaped; purplish crimson; flesh firm, very good. Middle of June. Carlisle, Pa.

Early Purple Guigne.* Size medium, round heart-shaped, distinctly dotted when ripening; dark red, becoming nearly black; flesh dark, tender, juicy, rich, sweet. Growth less vigorous than most heart cherries; shoots dark brown, spreading; leaves rather small, drooping on long petioles. Very early, ripening first ten days in June. Fig. 469.

Elkhorn. (Tradescant's Black Heart, Large Black Bigarreau.) Large, heart-shaped, surface slightly uneven; black; stalk rather short, or an inch and a fourth long; cavity rather deep; flesh solid, firm, not juicy, with a high, fine flavor, bitter before fully ripe. Rather late. Shoots dark gray.

Hoskins. Large, round heart-shaped, dull purple; flesh dark mottled, firm, sweet. Seedling of Napoleon. Oregon.

Jocosot. Large, regular, heart-shaped, indented at apex; glossy, nearly black; flesh tender, with a sweet, rich flavor. Last of June. Ohio.

Kennicot. Large, oval heart-shaped; amber-yellow, mottled and shaded with bright red; flesh firm, rich, sweet. Early in July. Cleveland, Ohio.

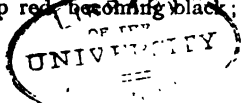
Knight's Early Black.* Large, obtuse heart-shaped, surface slightly uneven; black; stalk an inch and a fourth or an inch and a half long, rather stout; cavity deep, narrow; flesh dark purplish crimson, tender, juicy, with a very rich, high, excellent flavor. Ripens nearly with the Black Tartarian. Shoots diverging or spreading. Much resembles the Black Eagle, but larger, earlier, more heart-shaped, and with a *much deeper cavity*. English. In some localities it appears to need a rich soil and warm situation to develop its excellence. A moderate and sometimes poor bearer. Fig. 468.

Leather Stocking. Medium, heart-shaped; reddish black; flesh firm, sweet. Last half of July. Cleveland, Ohio.

Logan. Rather large, obtuse heart-shaped, indented at apex; purplish black; flesh rather firm, sweet, rich. Last half of June. Cleveland, O.

Manning's Late Black. Large, roundish; deep purple or black; flesh purplish, half tender, sweet, excellent. End of June. Salem, Mass.

May Bigarreau. (Baumann's May of Downing, Bigarreau de Mai.) Rather small, oval heart-shaped, becoming as it ripens nearly round; color deep red, becoming black; stalk an inch and three-



fourths long, rather stout at the ends; cavity narrow; flesh dark crimson, juicy, rather sweet, not high flavored. Very early, or first ten days of June. Productive. Shoots diverging, brown, resembling in color those of the Mayduke. Fig. 467.

Mezel.* (Great Bigarreau, Great Bigarreau of Mezel.) Large, obtuse heart-shaped; surface uneven, dark red, becoming black; stalk long, slender; flesh rather firm, rich, very good. First of July. Shoots slightly flexuous; tree great bearer.

Osceola. Rather large, heart-shaped; dark red, nearly black; flesh tender, sweet, very good. End of June. Cleveland, O. Dr. Kirtland.

Pontiac. Large, roundish heart-shaped; dark red, becoming nearly black; flesh half tender, sweet, and agreeable. Cleveland, O. Dr. Kirtland.

Powhatan. Size medium, roundish; dark purple, glossy; flesh purplish red, half tender, with a pleasant flavor. End of July. Cleveland, O.

Richardson. Large, heart-shaped; blackish red; flesh deep red, half tender, sweet. Last of June. Massachusetts.

Tecumseh. Rather large, obtuse heart-shaped; reddish purple; flesh dark red, half tender, with a rich sub-acid flavor. End of July. Cleveland, O.

Wendel's Mottled Bigarreau. Medium or rather large, obtuse heart-shaped; dark red, becoming nearly black, mottled with dark streaks or points; suture a dark line on one side; stalk medium; cavity round, irregular; flesh firm, crisp, high flavored; stone small. Rather late. Growth upright. Albany, N. Y.

Werder's Early Black Heart. Large, roundish heart-shaped; skin black; flesh purplish, tender, very good. First half of June.

Section II. Bright red or lighter.

American Heart.* Medium or rather large, four-sided heart-shaped; color light red or pink, mixed with amber; stalk nearly two inches long, slender; cavity small and shallow; flesh half tender, adhering to the rather tough skin, juicy, sweet, good. Very productive. Early.

Belle d'Orleans.* Rather large, roundish heart-shaped; light yellow, with pale red; flesh tender, with a sweet, excellent flavor. Middle of June. Tree a good grower. Productive. A valuable early sort.

Burr's Seedling. Rather large, distinct heart-shaped, smooth; a fine deep clear red, often spotted or marbled; stem an inch and a half long; cavity moderate; flesh half tender (about as firm as American Heart, from which it probably originated), sweet, rich, with a fine flavor. Growth vigorous, very productive. Season medium. Origin, Perrinton, N. Y.

Carmine Stripe. Rather large, heart-shaped; a carmine line on the suture, amber yellow with bright carmine; flesh tender, agreeable. Last of June. Ohio.

Caroline. Rather large, roundish oblong; pale amber mottled with red; tender, sweet, delicate. Last of June. Cleveland, O.

Centennial. Large, yellow, marbled crimson, very sweet, good shipper. A seedling of Napoleon. New. Fig. 472.



FIG. 472.—Centennial.

juicy, sweet, very rich. Season early, or with Black Tartarian. Origin, Cleveland, O.

Champagne. Medium, roundish heart-shaped; reddish pink; stalk medium, cavity shallow; flesh amber colored, sub-acid, rich. Last of June. Raised by C. Downing, Newburg, N. Y.

China Bigarreau. Medium in size, oval heart-shaped, somewhat roundish, suture distinct; color amber mottled with red, becoming red; stalk long, slender, cavity shallow; flesh half tender when ripe, with a rather rich and peculiar second-rate flavor. Season rather late. Shoots spreading. Origin, Flushing, L. I.

Cleveland.* (Cleveland Bigarreau.) Large, round heart-shaped; suture broad and deep half way round; color bright, clear, delicate red on amber yellow; stalk an inch and a half long, curved; flesh firm, juicy, sweet, very rich. Season early, or with Black Tartarian. Origin, Cleveland, O.

Coe's Transparent.* Size medium, nearly globular, very regular; skin thin, pale amber, reddened in the sun, with peculiar pale spots or blotches; stalk nearly an inch and a half long, moderately sunk; very tender, melting, sweet, excellent. Early, just before Black Tartarian. Growth thrifty. Origin, Middletown, Conn. One of the most valuable of all cherries. Fig. 473.

Delicate. Rather large, roundish, oblate; stalk medium in length, cavity rather large; color yellow, mottled and shaded with carmine, translucent; flesh light yellow, flavor excellent. 1st of July. Tree spreading, forming a round head. Cleveland, O.

Doctor. Size medium, round heart-shaped; color light yellow and red, blended and mottled; stalk an inch and a half long; cavity round, regular; flesh white, tender, juicy, sweet, fine. Very early. Resembles American Heart, but two weeks earlier. Growth moderate, spreading leaves, narrow. Origin, Cleveland, O.

Downer.* (Downer's Late, Downer's Late Red.) Size medium, round heart-shaped, smooth; red, light amber in the shade; stalk an inch and a half long, slightly sunk; fruit in clusters; flesh tender, melting, rich, very high flavored—not good till fully ripe. Rather late. Growth erect. Hangs late, and does not rot easily. Origin, Dorchester, Mass. Fig. 475.

Downing's Red Cheek. Size medium or rather large, obtuse heart-shaped, regular; suture distinct; color with a broad crimson cheek; stalk an inch and a half long; cavity of medium size; flesh half tender, delicate, sweet, rich, very good. Rather early. Origin, Newburg, N. Y.

Downton.* Large, round heart-shaped, apex quite obtuse, or slightly indented; light cream color, stained with red; stalk an inch and three-fourths or two inches long, slender; cavity wide; flesh yellowish, tender, adhering slightly to the stone, rich, delicious. Season medium or rather late. Growth rather spreading. Fig. 474.

Early Prolific. Medium, roundish heart-shaped; color bright red on yellow ground; stalk long; flesh half tender, very good. Early. Cleveland, O.

FIG. 473.
Coe's Transparent.

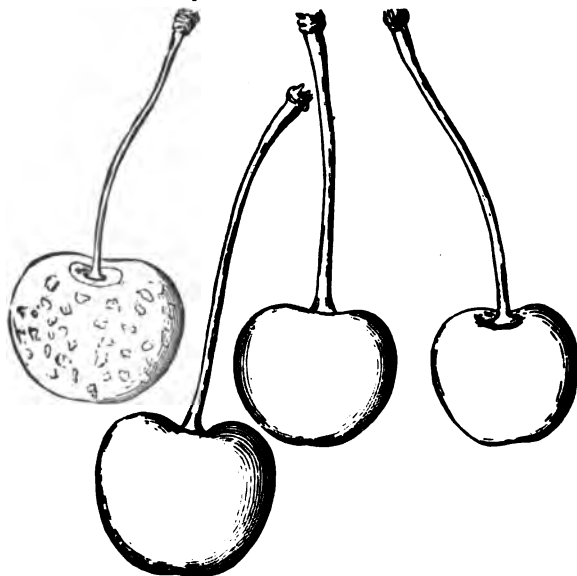


FIG. 474.
Downton.

FIG. 475.
Downer's Late.

FIG. 476.
Early White Heart.

Early White Heart. Medium, or rather small, heart-shaped, slightly oblong, often a little one-sided, suture distinct; color dull whitish yellow, tinged and spotted with pale red; stalk an inch and three-fourths long, cavity wide, shallow; flesh rather firm, tender when ripe, sweet, pleasant. Quite early. Growth erect. An old sort, now becoming superseded. Fig. 476.

Elliott's Favorite. Size medium, round, regular, slightly compressed; color pale amber yellow, with a bright, marbled, carmine-red cheek; stalk an inch and a half long; cavity even and regular; flesh pale amber, translucent, tender, delicate, juicy, with a sweet, fine flavor. Season medium, ripening with Belle de Choisy. Shoots vigorous, diverging. Origin, Cleveland, O.

FIG. 477.
Florence.

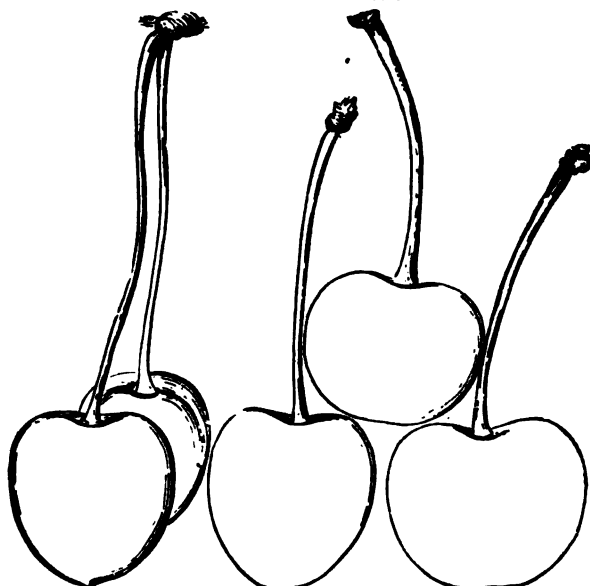


FIG. 478.
Elton.

FIG. 479.
Holland Bigarreau.

FIG. 480.
Bigarreau or
Yellow Spanish.

Elton.* (Flesh-Colored Bigarreau.) Large, pointed heart-shaped, somewhat oblong; pale yellow, blotched and shaded with red; stalk two inches long, slender; flesh firm, becoming rather tender, rich, high flavored, "very good." Season medium or rather early. Growth spreading, rather bending, petioles reddish purple. A cross between the Graffion and White Heart. English. Rather tender in very severe climates. Fig. 478.

Florence. (Knevett's Late.) Large, heart-shaped, regular, smooth; amber yellow marbled with red, and with a red cheek; stalk an inch and a half long; flesh firm, juicy, sweet; season rather late. Resembles Yellow Spanish, but hardly so large, and ten days later. Fig. 477.

Dr. Wiseman. Large, yellowish, shaded red; resembles Gov. Wood. Tree tender, does well in North Carolina.

Governor Wood.* Large, roundish heart-shaped; light yellow shaded and marbled with light red; stalk an inch and a half long, cavity wide; rather tender, nearly sweet, rich, excellent. Middle of June. Tree vigorous, shoots diverging, forming a round head. Cleveland, O. As the trees grow older, they often overbear and yield a smaller and less excellent fruit—hence requiring thinning.

Hoadley. Rather large, roundish heart-shaped; light clear red on pale yellow; flesh tender, rich, sweet, excellent. Last week of June. Origin, Cleveland, O.

Hovey. Large, obtuse heart-shaped; amber, with a fine red cheek; stalk an inch long, deeply set; flesh rather firm, pale amber, "very good." Last half of July. Boston, Mass.

Hyde's Late Black. Medium, obtuse heart-shaped; purplish black; flesh half firm. First week in July. Newton, Mass.

Kirtland's Mammoth. Very large, obtuse heart-shaped; rich red on bright, clear yellow; flesh rather tender, with a fine, high flavor. A moderate bearer. End of June. Cleveland, O.

Kirtland's Mary.* Quite large, round heart-shaped, regular, base somewhat flattened; color light and dark red, deeply marbled on a yellow ground; stalk an inch and a fourth to an inch and a half long; flesh light yellow, half tender, rich, juicy, sweet, high flavored. Season medium, or with the Elton. Origin, Cleveland, O.

Manning's Mottled. (Mottled Bigarreau.) Medium or rather large, round heart-shaped, suture distinct; color amber, shaded and mottled with red; semi-transparent, glossy; stalk slender, cavity shallow; flesh yellow, tender when ripe, sweet, good. Stone rather large. Season, end of June. Shoots dark. Productive. Origin, Salem, Mass.

Napoleon Bigarreau.* Very large, regularly heart-shaped, remotely oblong; skin pale yellow and amber, spotted and shaded with deep red; stalk an inch and a fourth long; flesh very firm, with a fine but hardly first-rate flavor. Rather late. Shoots with a light greenish cast. Growth rather erect, vigorous. Very productive, and good for market, but too firm and deficient in flavor for the small garden. Fig. 482.

The *Holland Bigarreau* closely resembles the above, and is thought by some to be identical.

Ohio Beauty. Very large, oblate heart-shaped; dark red on a pale red ground, somewhat marbled, very handsome; stalk an inch and a half long, rather stout; cavity wide and deep; flesh white, tender, juicy, with a fine flavor. Early, or about ten days before Napoleon Bigarreau, which it equals in size. Origin, Cleveland, O.

Red Jacket.* Large, obtuse heart, shaped; color light red; flesh half tender, with a good sub-acid flavor. Ripens with Downer. Keeps well without rotting. Cleveland, O.

Rockport Bigarreau.* Quite large-round heart-shaped; color, when fully ripe, a beautiful clear red, shaded with pale amber, with occasional spots; stalk an inch and a half long, cavity wide; flesh firm, juicy, sweet, rich, with an excellent flavor. Season rather

early. Tree upright, vigorous. Origin, Cleveland, O.; one of the best of Dr. Kirtland's seedlings. Fig. 481.

Sweet Montmorency. Medium in size, round, slightly flattened at base, with a depressed point at apex; color pale amber, mottled with light red; stalk an inch and three-fourths long, slender; cavity small, even; flesh yellowish, tender, sweet, excellent. Season very late or past midsummer. Approaches somewhat in character the Morello. Origin, Salem, Mass.

Townsend. Large, obtuse heart-shaped, high-shouldered, suture distinct; light amber with red; flesh rather tender, with a rich, pleasant flavor. End of June. Lockport, N. Y.

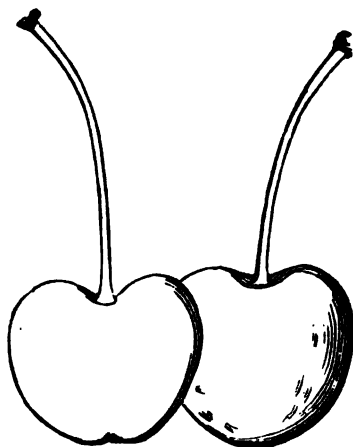


FIG. 481.
Rockport
Bigarreau.

FIG. 482.
Napoleon
Bigarreau

White Bigarreau. (Large White Bigarreau, White Ox-Heart.) Large, heart-shaped, tapering to obtuse apex, suture distinct; surface slightly wavy, yellowish white marbled with red; flesh moderately firm, or half tender, very rich and delicate. Season medium. A moderate bearer when young, more productive afterward; liable to crack after rain. Tree rather tender; growth spreading.

Yellow Spanish.* (Bigarreau, Graffion.) Very large, often an inch in diameter, obtuse heart-shaped, very smooth, regular, base flattened; surface clear, pale waxen yellow, with a handsome light red cheek to the sun; stalk an inch and three-fourths long; cavity very wide, shallow; flesh firm, with a fine, rich flavor. Season medium, or last of June. Shoots stout, diverging or spreading. Fig. 480. The *Late Bigarreau*, originated with Dr. Kirtland, of Cleveland, resembles this, but is slightly less in size, deeper red, and ripens about ten days later.

CLASS II. FRUIT ROUND.

Section I. Fruit black, dark red, or crimson.

Archduke. (Portugal Duke, Late Archduke.) Very large, round heart-shaped, slight flattened, dark shining red, becoming nearly black; stalk an inch and a half long, slender, deep sunk; flesh light red, when matured rich sub-acid, slightly bitter till fully ripe, of fine flavor, hardly equal in quality to Mayduke. Season very late, or just before midsummer. One-fourth larger than Mayduke, and tree more spreading, and with thicker and darker foliage. Rare.

Donna Maria.* Size medium, dark red; rich, acid. Late. Succeeds well at the West.

Early Morello. Size small round oblate, red, small pit, flesh firm, juice uncolored. A little earlier than Early Richmond.

Late Duke. Large, obtuse roundish heart-shaped, slightly oblate; color light, mottled with bright red at first, becoming rich dark red when ripe; stalk an inch and a half long, rather slender; cavity shallow; flesh pale amber, sub-acid, not rich, much less so than Mayduke; season very late, or a little after midsummer. Tree more spreading than Mayduke, and foliage rather more compact, approaching somewhat the character of a Morello.

Lewelling. Very large, black, round, heart-shaped; flesh firm, solid. Valuable.

Louis Philippe. Size medium, roundish; dark red; flesh red, acid, tender. Middle or July. French. Succeeds well at the West.

Mayduke.* Large, roundish, obtuse heart-shaped; color red at first, becoming when mature nearly black; flesh reddish, becoming dark purple, very juicy and melting, rich, acid, excellent. It is frequently picked when red, immature, and not fully grown, and imperfect in flavor. Quite early—but often varying greatly and permanently in its season of ripening, even on the same tree. Holman's Duke and Late Mayduke are only late variations perpetuated by grafting. Growth upright for a Duke. Very hardy, and adapted to all localities.

Montmorency. Large, round, bright red, acid. Tree hardy, great bearer; fruits young. A good market variety.

Morello.* (English Morello, Large Morello, Dutch Morello, Ronald's Large Morello.) Rather large, approaching medium; round, obscurely heart-shaped; dark red, becoming nearly black; flesh dark purplish crimson, of a rich acid, mixed with a slight astringency. Season very late, or after midsummer. In England its ripening is retarded till autumn by the shading of a wall. The common Morello is a smaller sub-variety, a little darker and with smaller branches.

Ostheim. Large, roundish, dark red; flesh liver color, tender, juicy, sub-acid, when fully ripe nearly sweet, good. Very hardy, slender growth. Russian.

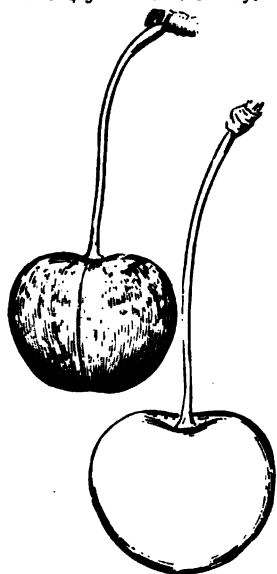
Royal Duke. (Royal Tardive.) Very large, roundish, distinctly oblate; surface dark red; flesh reddish, tender, juicy, rich; season rather late. Growth like the Mayduke. Rare.

Shannon. Medium, round, flattened at base; dark purplish red; stalk long, slender, open; flesh reddish purple, rather acid. Middle of July. Cleveland, O.

Section 11. Fruit bright red or lighter.

Belle de Choisy.* Size medium, round, very even, obscurely oblate; skin thin, translucent, showing the netted texture of the flesh; stalk rather short, slender; flesh pale amber, mottled with yellowish red, becoming in the sun a fine carnelian red; skin very tender, with a fine, mild, sub-acid flavor, becoming nearly sweet. Season rather early. Moderately productive; needs good cultivation. French. Fig. 483.

FIG. 483.—Belle de Choisy.



Belle Magnifique.* Quite large, roundish, inclining to heart-shaped; color a fine rich red, portions of the surface often a lighter hue; stalk slender, nearly two inches long, cavity large; flavor rather mild for this class, fine, but not of the highest quality. One of the best late varieties, ripening about midsummer. Productive. Fig. 484. Growth resembles that of the Mayduke in form. French.

FIG. 484.—Belle Magnifique.

Belle de Sceaux. Size nearly medium, roundish; red; stalk moderate; flesh rather acid—the tree and fruit somewhat resembling Early Richmond, but later.

Carnation. Large, round, yellowish white, mottled and marbled with fine orange red; stalk an inch and a fourth long, stout; flesh slightly firmer than most of this class, a little bitter at first, becoming mild acid, and with a rich, fine flavor. Growth spreading, leaves resembling those of a heart cherry. Very late, ripening about midsummer.

Prince's Duke is a large sub-variety, but a very poor bearer and of little value.

Coe's Late Carnation. Rather large, medium; color amber and bright red; sub-acid, sprightly. Last half of July.

Duchesse de Palluau. Size medium, roundish heart-shaped; dark purple; stalk long, slender; cavity large; flesh dark red, mild, acid. Middle of June.

Early May. (Cerise Indulle.) Small, round, approaching oblate, bright high red; stalk an inch long; flesh juicy, acid, good. Very early. Tree dwarfish. Of little value.

Early Richmond.* (Virginian May, Kentish, Kentish Red, English Pie Cherry.) Rather small, becoming medium when well ripened, round, slightly oblate, growing in pairs; color a full red; stalk an inch or an inch and a fourth long, rather stout; flesh very juicy, acid, moderately rich. Stone adhering strongly to the stalk, often withdrawing it from the fruit when picked. Very productive; fine for early cooking; ripens early and hangs long on the tree. Of great value at the West.



FIG. 485.—Rocky Mountain Cherry.

Jeffrey's Duke. (Jeffrey's Royal, Royale.) Size medium, round, obscurely oblate; color a fine lively red; stalk medium; flesh amber with a tinge of red, rich, juicy, of fine flavor. Growth slow, very compact, fruit in thick clusters. Season medium. Resembles Mayduke, but smaller, rounder, and lighter colored. Rare in this country.

Large Morello. (Kirtland's Large Morello.) Rather large, roundish; dark red, with a good, rich, sub-acid flavor. Early, July. Cleveland, O.

Pie Cherry. (American.) (Late Kentish of Downing, Common Red, American Kentish.) Size medium, approaching small, roundish, slightly oblate; stalk an inch to an inch and a half long, stout; color light red; flesh very juicy, quite acid, moderately rich. Rather late. Stone not adhering to the stalk, as with the preceding. Very productive; a good culinary sort.

Plumstone Morello.* Large, roundish heart-shaped; color deep red; stalk an inch and a half long, slender, straight; cavity mod-

erate; flesh reddish, of a rich acid flavor. Very late, or after mid-summer. Stone rather long and pointed.

Reine Hortense.* Quite large, roundish oblong; bright red, slightly marbled and mottled; suture a mere line; sub-acid, rich, excellent. Last half of July. Tree a handsome, good grower, a moderate bearer. French.

Vail's August Duke. Large, obtuse heart-shaped; bright red; stalk medium; sub-acid, with a Mayduke flavor. First of August. Vigorous and productive. Troy, N. Y.

CLASS III. NATIVE DWARF CHERRIES.

The three varieties described below are as yet the only ones which have been at all cultivated or experimented upon. They are of



FIG. 486.—Sand Cherry.

little value for commercial purposes, or for home use, but are worthy of planting on barren soils and for ornamental purposes. It is quite within the range of possibility that valuable seedlings or hybrids may spring from them under intelligent cultivation.

Rocky Mountain. (Improved Dwarf.) Small, roundish, jet black, not very sweet. Tree small, bushy, not over four feet high, very hardy, bears profusely. Worthy of cultivation as an ornamental shrub. Colorado. Fig. 485.



FIG. 487.—Utah Hybrid.

Sand Cherry. Small, roundish oval, black, variable in quality, usually very acid; ripens about August 1st. A very hardy shrub; branches irregular, coarse, and scrawny, bears profusely, grows on the poorest soils. Fig. 486.

Utah Hybrid. Small, round, dark-reddish black with a plum-like bloom; flesh soft, juicy, skin bitter. A bush three or four feet high. Fig. 487.

CHAPTER XIX.

THE CRANBERRY.

THE American Cranberry (*Vaccinium macrocarpon*) is much larger than the European (*V. oxycoccus*), and superior in flavor. While growing it is light green, changing to a light or dark red, crimson, or mottled color, as it ripens. It blossoms in

June, and the fruit ripens in September and October. The running stems are often several feet in length, the small oblong leaves remaining during winter, on the approach of which they become brown. There are three types recognized. The Bell type (Fig. 488) is so called from its peculiar form; the Bugle (Fig. 489) somewhat resembles a bugle head; and the Cherry (Fig. 490) is nearly round.



FIG. 488. — Bell Cranberry.

While the differences in the external appearance of cranberries offered for sale are manifest to the most casual inspection, there seems even now to be no recognized named varieties. In parts of the country where its cultivation is extensively carried on, as Cape Cod, local names have been given to choice kinds, but they are not as yet catalogued by dealers in nursery stock.

The cranberry is successfully cultivated in this country between 38° and 45° north latitude; but its limit may extend farther southward in the mountain ranges.

SOIL.

The best soil and situation consist of peat and muck bottoms, coated with pure sand obtained from adjacent banks, and the ground thus prepared must be capable of being flooded with clear running water at pleasure during winter, and thoroughly drained at other times, for it is absolutely essential that it should be dry during the blooming and growing season. Drift soils have proved unsuccessful. Muddy water running over the plants injures them.

In preparing the soil all wood and rubbish must be cleared off, called "turving," and the surface, or "turf," removed with a hoe made for the purpose. It is then provided with drains by clearing out the main water-course and making parallel open side ditches at regular distances of about two to five rods. The whole surface is then covered with from four to six inches of pure sand. The chief object of this coating of sand is to retard the growth of the vines and thus increase their productiveness. An embankment or small dyke should surround the whole to allow the plantation to be flooded or drained at pleasure.

Setting the plants. After sanding, the plants are set in rows about two feet apart. Some prefer a greater distance, to admit more freely the passage of a horse cultivator. They should be ten or twelve inches in the row.

Flooding should be continued at intervals from December to May, and furnishes, among other advantages, protection from insects as well as from early frosts.

The plantation should be carefully kept clear of weeds for the first two or three years, after which, if well managed, the cranberry plants will cover the surface and render this labor comparatively light.



FIG. 489.—Bugle Cranberry.

On looking under, the soil was always moist. Heavy pruning must follow the luxuriant growth thus produced. Currants thrive best when they are somewhat shaded, and consequently an excellent position for them is in the rows of young orchard trees. Clean cultivation cannot be too strongly insisted upon.

The different varieties of the currant succeed nearly alike in the Northern, Middle, and Western, but fail in the Southern States.

PRUNING THE CURRANT.—In the culture of the currant



FIG. 491.—Raceme of Currants.

three distinct modes are adopted. The first, which is quite common in this country, is to plant the bushes along garden fences, where they often grow up with grass, and being neither cultivated nor cared for, the fruit becomes small and of little value. This is the worst mode.

The next is to cultivate, but not to prune. The fruit on such bushes is fine while they are young, but as they become filled with a profusion of old bearing wood it diminishes in size.

The third and best mode is to give them good, clean cultivation, and to keep up a constant supply of young bearing wood, yielding large and excellent crops.

The currant, like the cherry, bears its fruit on shoots two or more years old; and it is important that a succession of strong young shoots be maintained for this purpose. The branches of the heads should therefore be distributed at equal distances, and the old bearing spurs cut out when they become too thick or enfeebled, and new shoots allowed successively to take their place (Fig. 491).

When a young currant bush is set out, all the buds or suckers

below the surface of the ground should be previously cut off clean, so as to form a clear stem. It is often recommended that this stem be a foot high before branching—which does well for the moist climate of England; but under our hot suns it is better that the branches begin near the surface of the ground.

Old currant bushes, such as have grown up to a thick mass,



FIG. 492.—Cherry Currant.



FIG. 493.—North Star.

may be greatly improved, and will increase the fruit several times in size, by thinning out clean all the old crooked wood, and leaving a sufficient number of young stems at equal distances, to bear the future crop.

CLASS I. *Red and White Currants.*

Attractor. Large, very white, handsome, strong grower and productive. French.

Cherry Currant.* Very large, nearly twice the size of the common Red Dutch, often five-eighths of an inch in diameter; round, dark



FIG. 494.—Paluan.



FIG. 495.—Red Cross.

red; clusters moderately short, quite acid. Growth large, tall, and luxuriant. Sometimes unproductive. Italy. The flavor is improved by hanging long. Fig. 492.

Gondoin Red. (Raby Castle, May's Victoria, Rouge d'Holland.) Large, bright red, bunch long; bush shoots strong, vigorous. The leaves and fruit hang long. It proves of good quality by the first of September. Much earlier, it is sour and unpalatable.

Gondoin White. Fruit large, whitish yellow, less acid than most other sorts, of excellent quality. A strong grower and productive.

Knight's Large Red. Size of berries moderate, or nearly as large as Red Dutch—bright red. This is not a sweet currant, and is rather more acid than White Dutch.

Knight's Sweet Red. (Goliath, Fielder's Red, Palmer's Late Red, Pitmaston Red, Pitmaston Prolific, Large Sweet Red, Bertin No. 1, Danen's Selected.) Berries medium, bright red; bush strong and vigorous; shoots mostly erect.



FIG. 496.—Red Dutch. FIG. 497.—White Dutch. FIG. 498.—White Grape,

North Star. Medium size berry on long stem, bright crimson, sweet and rich. Very hardy. Bears early and profusely. Vigorous. Does well in the West. Fig. 493.

Palau.* (Fertile Currant of Palau.) Large, dark red. Productive, nearly the size of the Cherry Currant. French. New. Fig. 494.

Prince Albert.* Large, light red, ripens quite late. Growth strong, productive.

Red Cross. Large, red berry, long cluster and stem long between fruit and stem; flavor mild, sub-acid. Growth vigorous, productive. A valuable new fruit. Fig. 495.

Red Dutch.* (Fertile, Fertile d'Angleterre, Fertile de Bertin, La Hative, Hative de Bertin, Bertin No. 9, Belle de St. Gilles, Che-nonceaux, Grosse Rouge de Boulogne, Queen Victoria, Red Grape.)

Bush generally dwarf, somewhat slender habit. Prolific bearer, ripens early. A little larger than the common old red currant, and clusters much longer and a little less acid. Fig. 496.

Transparent. Large, yellowish white, very productive; resembles White Dutch, but larger.



FIG. 499.—Black Naples.



FIG. 500.—Champion.

Versaillaise.* (La Versaillaise. Red Cherry.) Large, closely resembles Cherry Currant, but slightly less acid; deep red, bunches long but regularly filled, bush rank grown, the young shoots break off very easily. Productive, valuable. French. New. La Fertile and La Hative scarcely differ from Versaillaise.

White Dutch.* Full medium in size, yellowish white, bunches rather long; less acid than Red Dutch and other red currants. Dana's White is nearly identical. Fig. 497.

White Grape.* Large (rather larger than White Dutch); bunches rather short, quality excellent. Growth spreading and moderately vigorous. Fig. 498.

CLASS II. *Black Currants.*

Black Naples. Large (sometimes five-eighths of an inch in diameter), black; bunches small, with a strong musky flavor. A coarse grower. Fig. 499.

Champion.* Large berries, black, flavor mild and good, prolific, superior to Black Naples. Good for cooking, jams, etc. Best. Fig. 500.

Common Black or Black English. Large, one-third of an inch in diameter, quite black, clusters very short, with a strong odor; flavor poor.

Crandall. Large, blue black, mild, sub-acid, spicy. Bush vigorous and prolific. The best of the blacks.

CHAPTER XXIII.

THE GOOSEBERRY.

WITH the advent of the practice of applying fungicides new possibilities are opened up for success in propagating and obtaining satisfactory and profitable crops of the superb varieties of these fruits, so much esteemed abroad. The field is an inviting and a promising one, and offers opportunities to the painstaking cultivator which will no doubt prove encouraging and remunerative. Few even of our native varieties of gooseberries are wholly free from mildew, and no one who plants them should neglect spraying.

The propagation and cultivation of the gooseberry are similar to that of the currant (see p. 331).

Of the English gooseberries many hundreds have been named and described, and large numbers have been imported and tried in this country, but they have so generally mildewed and become worthless after bearing a year or two that they have been mostly discarded. A few of the best are included in the list below and in the Index of Fruits.



FIG. 501.—Columbus.

VARIETIES.

Columbus.* Large, oval, greenish yellow, smooth, good. Hardy, vigorous, productive, free from mildew. Fig. 501. A valuable sort.

Crown Bob. (Melling's Crown Bob.) Large, often an inch and a fourth long, roundish-oval, red, hairy; flavor of first quality; branches spreading or drooping. Fig. 502.

Downing.* (Downing's Seedling.) Medium or rather large, oval, pale green, very good; bush upright, productive. Larger than Houghton. Bush of strong, heavy growth, very spiny. Fig. 503.

Golden Prolific. Medium size, long oval, deep yellow, flavor good, hardy and prolific. Fig. 504.

Houghton's Seedling.* Fruit small, oval, commonly about three-

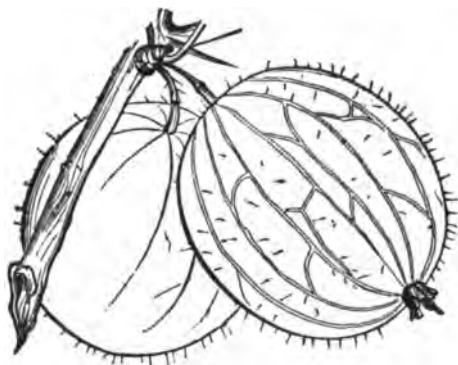


FIG. 502.—Crown Bob.

fourths of an inch long; skin smooth, thin, glossy, a pale dull reddish brown, marked with faint greenish lines; flesh tender, juicy, sweet, pleasant. Ripens soon after midsummer. Not high fla-



FIG. 503.—Downing.



FIG. 504.—Golden Prolific.

vored, as compared with the best European sorts, but a profuse bearer, free of mildew, and of very easy cultivation. A seedling from a wild American species. Fig. 505. Origin, Salem, Mass.

Industry. Large, oval, dark red, hairy. Vigorous upright growth, prolific. A recent English variety and very promising; requires rich soil. Fig. 506.

Lancashire Lad. Large, bright red, smooth, excellent quality. Vigorous and productive. A favorite English berry. Fig. 507.

Mountain Seedling. This sort resembles the Houghton in color—but is mostly larger in size, has a thicker skin, and is slightly inferior in quality. Bush strong and upright.



FIG. 505.—Houghton's Seedling.



FIG. 506.—Industry.



FIG. 507.—Lancashire Lad.

Pale Red. Rather small, or size of Houghton, but darker in color when fully ripe.

Parkinson's Laurel. Large, obovate, green, downy; flavor of first quality; branches rather erect.

Red Jacket. Medium, oval, red, smooth, flavor good. Prolific, vigorous grower. Claimed to be mildew proof.

Red Warrington. Rather large, roundish oblong, hairy; flavor of first quality. Hangs long without cracking and improves in flavor. Branches drooping.



FIG. 508.—Smith's Improved

Roaring Lion. (Farrow's Roaring Lion.) Very large, oblong-oval, red, smooth; flavor fine; hangs long; branches drooping.

Smith's Improved. Larger than Houghton, light or yellowish green, excellent in quality. Bush of moderate growth. Fig. 508. New.

Wellington's Glory. Large, oval, very downy; skin quite thin; flavor excellent; branches erect.

Whitesmith. (Woodward's Whitesmith.) Rather large, a little over an inch long, roundish oval, slightly approaching oblong,



FIG. 509.—Whitesmith.

yellowish white, very slightly downy; flavor of first quality; branches rather erect. Fig. 509.

Whinham's Industry. See Industry.

CHAPTER XXIV.

THE GRAPE.

THE production of new varieties of grapes through seedlings and by cross-fertilization is so easy that the number thus annually introduced is hardly, if at all, inferior to the new varieties of strawberries. While occasionally the merits of a new grape, either in the high quality of the berry, its ability to bear transportation, and its handsome appearance, or the hardiness of the vine and its freedom from disease, compel for it a permanent place in our list of standards, still the great majority have but a fleeting existence, and seem to serve only to keep the Experiment Stations busy and to confuse and annoy the nurserymen. It is manifestly impossible, even if it were advisable, to include in the following list of varieties anything like a complete catalogue of all the experimental fruits which have been produced and more or less fully described and praised. It is believed, nevertheless, that all which have established a place in this country will be found enumerated.

It must be borne in mind that with grapes, even more than some other fruits, the location in which they are grown has a great influence, favorably or otherwise, upon all the characteristics both of vine and berry. Varieties which are of superlative merit in some places are almost valueless in others, and *vice versa*. The safe rule in selecting and planting is to consult the State Experiment Station.

In the recent past one aim of propagators was to grow varieties which by consecutive ripening would prolong the season. Since the general adoption of the cold-storage systems, however, the question is now, which grapes of high quality are the best keepers. Good, plump, handsome-looking fruit thus kept over is to be purchased up to the first of April, and the

possibilities are in favor of a still longer extension of their season.

That period is now exceeded, among all our kinds of fruit, only by the apple and pear. The apple now fills the whole yearly circle—"it belts the year." The pear continues to ripen from midsummer until the following spring, although there are few sorts that keep well after January; grapes may be kept in cold storage almost as easily as winter apples. The peach in the North continues to ripen scarcely two months at furthest—the plum about the same—while neither will keep long in a fresh state. The hardy grape will yet give us a delicious fruit remarkable for its wholesomeness, in unlimited quantity if we desire it, scarcely if ever failing with seasons—not less than eight out of the twelve months of the year.

PROPAGATION OF THE GRAPE.

The vine is propagated by *seeds, layers, cuttings*, and by *grafting*.

Seeds are planted only for obtaining new varieties, by cross-fertilization as described in an early chapter of this work.

The facility with which the grape emits roots on its young stems, and the rapidity of its growth, render it one of the most easily propagated of all bearers of fruit. The new shoots, buried before midsummer, with a few inches of permanently moist earth, do not fail to throw out plenty of young fibres from every buried joint the first season. Cuttings and single bud under favorable circumstances will root with equal certainty.

LAYERS—*Summer Layering*.—Layering is the easiest and most certain, but not the most rapid mode of propagating the grape. It may be done on a small scale, for amateur purposes, without any special preparation, by using accidental or straggling shoots, or those purposely left near the foot of the vine. Usually a little before mid-summer these shoots will have hardened sufficiently to prevent the rotting which might occur if buried too soft or green. Extend the shoot on the ground in order to determine the most convenient spot for excavating under the centre. Then make a small hole or

depression with the spade, bend a shoot into this hole and cover it with a few inches of earth, as shown in the following figure (Fig. 510). The surface of the ground must then be kept clean and mellow for the purpose of preserving moisture in the soil; and should the season be a very dry one, the surface should be mulched—that is, covered with a few inches of fine grass or short straw. If the shoot is a strong and thrifty one, and grows well at its extremity out of ground, every joint will emit a profusion of roots, before the end of autumn presenting the appearance shown in Fig. 510. The layer may then be taken up by cutting it close from the vine and shortening-back its extremity, and then, by setting a spade far

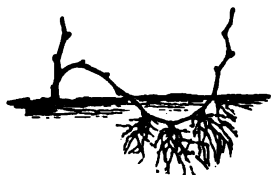


FIG. 510.—Grape Layer, the roots formed.

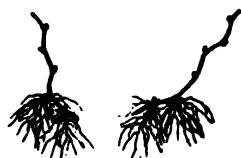


FIG. 511.—Grape Layer, separated into two plants.

under it, lifting the whole out of the ground. It is then cut in two and forms two strong plants as shown in Fig. 511. These layers may be then heeled-in or covered with earth for the winter, giving some protection from freezing by covering the surface with manure or leaves, or they may be packed for the winter in boxes of damp moss in the cellar.

Spring Layering.—As layers, like unmolested runners on the strawberry, exhaust the main plant, they should be taken very sparingly from bearing vines. When they are required in large numbers, vines should be planted specially for this purpose—the soil to be made very rich and well cultivated, so as to produce a strong growth of shoots—unlike the moderate fertility required for bearing crops. The spaces between these vines should be six or seven feet; and generally two or three years are required, in connection with cutting-back to two or three buds, and training one or two shoots to upright stakes, before the canes become strong enough to layer profitably. When this is the case, begin the work late in spring, about the time the buds open, by laying down the strongest

cane of the two into a smooth, straight trench made for the purpose, about five inches deep. The cane selected should not be less than eight or ten feet long, but so much of the end should be cut off as to leave only strong buds, the remaining part not being more than six or seven feet long. With short-jointed varieties it should be less in length. It is held in this position by pegs or stones. The object being to obtain a strong shoot at each eye, the end should not be bent up, which would draw the growth off in that direction. As soon as the new shoots have grown a few inches, the prostrate vines should be slightly covered with earth, which is to be increased as the growth advances. A more perfect way is to



FIG. 512.—Shoots springing from a layered stem.

sprinkle a little compost along the cane and then fill the trench a few inches with loose damp moss. This will preserve a proper humidity and afford sufficient light to the starting shoots. After they have become well hardened the moss is removed and mellow soil substituted. The earth, if applied too early, might induce rotting in the young stems. Fig. 512 represents the appearance of this process after the shoots have attained full growth and rooted well at the bottom. Usually about half a dozen plants are a sufficient number to raise from one cane; more will start, but they should be rubbed off to give strength to the remainder. When a part outgrow the others, they should be pinched back to equalize the growth. This process is repeated for successive years; but as it tends to exhaust the main plant it is advisable to suspend it occasionally for a year if the vigor becomes diminished.

These new plants are well rooted before winter; and should be taken up, separated, and packed away as already described. Fig. 513 represents one of these new plants.

It will be observed that while these plants were forming from the layered cane, one, two, or three shoots, according to the strength of the plant, should be trained to a stake for next season's work, the cane having been properly cut back for this purpose.



FIG. 513.—Newly formed layer plant.

CUTTINGS IN OPEN GROUND.—

This is sometimes an easy mode of raising plants, but is generally uncertain and often unsuccessful. Much depends on the character of the soil for retaining moisture, and still more on the humidity of the air, which varies in different localities and with seasons. A rich, moderately compact, deep, and mellow soil is required. It is especially important that it possess fertility in order to give the young plants a strong impetus the moment

new roots are emitted. Shoots of one season's growth are selected, of full medium size, omitting small or unripe portions. Where the winters are severe, this wood should be cut off late in autumn, shortened to convenient lengths, and packed in slightly moist earth, or, what is better, in damp moss, in boxes placed in a cellar. Sometimes the cuttings are placed in a bed in autumn, which answers well in mild climates, or where they are well protected during winter, with a thick layer of straw, manure, or leaves.



FIG. 514.
Grape
Cutting.

The cuttings are usually made about seven or eight inches long, and each one should have two or more buds. It should be pared away by a sharp knife immediately

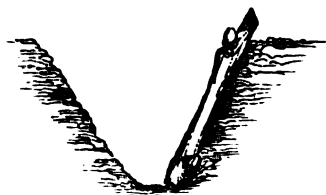


FIG. 515.—Mode of Planting Cuttings.

below the lower bud and about an inch above the upper one, as shown in Fig. 514. A trench (Fig. 515) is made with a

spade next to a line, nearly perpendicular on one side and sloping on the other. The cuttings are placed upright against the steep side, about three inches apart, so that the upper bud shall be about an inch below the level surface. Fill the trench to the upper bud by adding successive portions, dressing each firmly with the foot, but leaving the soil more loose and mellow above. After the shoots have grown a few inches the surface may be levelled by burying the upper bud an inch beneath it. Some cultivators are more successful by covering the surface with an inch or two of fine manure for the retention of moisture in the soil. Roots will be emitted from both buds, and handsomer plants will be formed by cutting off the lower part, leaving the roots of the upper bud only to remain.

PROPAGATION FROM SINGLE BUDS.—The various modes of propagating the vine from single buds admit the rapid multiplying of numbers required for work on a large scale; but artificial heat is always necessary, either on a small scale in hot-beds, or more extensively in propagating-houses.

Good, strong, well-ripened wood of one year's growth must be cut in autumn, and secured for winter as already described. The work of forming or planting the buds or eyes is usually done in March; and being inserted through the month by successive portions, the work of repotting and afterward setting out into open ground, may be also performed successively without crowding all the work into one period. It should not be done much later than early in April, when warm weather without may prevent the operator from giving the low temperature to the house required for the leaves and shoots during the early stages of growth.

The operation should be commenced by trimming the wood which holds the eyes into proper form—throwing them into water to prevent drying, until enough are prepared for setting in the beds or pots. Different modes or forms are adopted for these cuttings. One of the best for general practice is represented in Fig. 516, the cut being about two and a half inches long, with the bud at the upper end about a fourth of an inch from the top.

When hot-beds are employed in giving bottom heat, the cuttings are usually placed in pots; but in the more common

practice of employing propagating-houses, they may be placed either in pots, shallow boxes, which have been well soaked in lime-wash some months before to prevent the formation of mould or fungus, or directly in beds about three inches deep over the hot-water tanks in the house. The best material for receiving the buds is clean, pure building or lake sand, which is to be kept at all times at a uniform degree of moisture, but never *wet*. It is the practice with some to place a stratum of

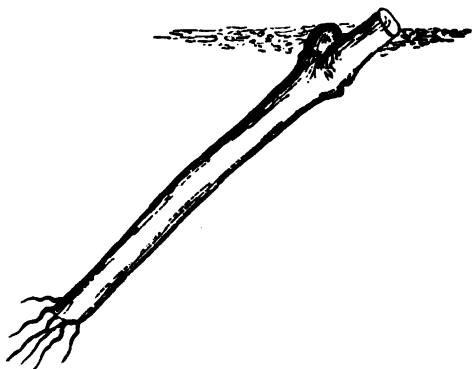


FIG. 516.

prepared soil (hereafter described) an inch beneath the wood for the reception of the new roots, and sustaining the young plants for a longer time than sand alone—thus obviating so early a removal into pots as would otherwise be required. Each bud or eye need not occupy more than two square inches of surface. When properly imbedded in the sand, a moderate heat should be at first applied, not higher than fifty degrees—the object being to commence roots before sufficient warmth is given to expand the leaves. For this purpose also, the temperature of the air in the house should be kept at all times at least ten degrees lower than that of the sand. In a few days from the commencement, the heat may be gradually raised, and as the leaves expand, it may be cautiously increased to eighty and ninety degrees. It is of great importance to avoid the checks given by sudden changes, from cold currents of air, cold water, or remitting fire.

When the roots have reached three or four inches in length

the plants should be potted off into a soil prepared for this purpose, by mixing about equal parts of clean sand and rich, rotten turf, or leaf mould in the place of turf. This mixture should be prepared several months beforehand, and be thoroughly pulverized and the parts mixed together; and unless the turf is quite rich, the addition of about one-fourth of rotten manure would be advisable. About a thirtieth part of wood ashes improves the mixture. Plenty of water should be given until the plants become established in their new home. When the roots reach the exterior of these pots they may be either transferred to larger ones or to the open ground—which completes the process for the first season.

GREEN CUTTINGS.—Propagating by cuttings of unripe wood is practised, when it is desired to increase new sorts rapidly, in connection with common propagation by single eyes. As they do not always mature well, or make strong vines the same season, they are objected to by many propagators. Occasionally, however, good strong vines may be obtained. They are made by taking strong shoots in summer, and making them into cuttings with one eye at the top, leaving on the leaf. These are inserted into sand (or the same kind of soil used for single eyes), as far down as the bud, the leaf resting on the surface. When small numbers are propagated, pots are used and moisture retained in the leaves by placing them under a glass frame in the propagating-house, where the proper degree of moisture is maintained without the excess which would cause rotting. On a larger scale the cuttings are placed in the borders of the propagating-house, the leaves forming one continuous green surface. These are kept constantly moist by watering them from the watering-pot, three or four times a day. In about three weeks they will be fit to remove to pots, and are then to be treated like other plants. They generally succeed best by being kept in the house during the remainder of the season, the wood ripening better and the vines becoming hardier, than if planted out in open ground, where there is not sufficient warmth to mature and harden the green wood.

ROOT GRAFTING.—This mode has also been extensively adopted for propagating on a large scale. It is done by taking a portion of the shoot with one bud, as shown in the annexed figure (Fig. 517), and inserting a piece of root cut wedge-form

into a cleft in the lower end of the cutting. Grafting-plasters bind the parts together, but they are left open below for the emission of roots. Varieties which furnish long, smooth roots are most convenient, of which the Concord is one of the best.

The grafts are placed in shallow boxes of a convenient size, or about one by two feet, and three inches deep, and bottom heat given as before described, but less care is required in controlling the temperature.



FIG. 517.
Root Graft

GRAFTING IN OPEN GROUND.—Large vines and vineyards of undesirable sorts are sometimes changed to better by grafting. It is uncertain of success, at best; although the grafts, when they do not fail to grow, push with great vigor, and frequently extend twenty feet or more in a single season. There are three different modes: one is to graft early in spring down into the root; the second is to defer the work until the buds swell and bleeding ceases, preserving the grafts in a dormant state in a cool place. The third, and generally the most successful, is grafting in autumn, according to the mode described in Fuller's "Grape

Culturist." A cleft graft is made at or near the surface of the earth, and the parts firmly bound together. An inverted pot is then placed over it and banked with earth, except the top, which is covered with six inches of straw, and the whole then buried in earth. This is removed in spring. Grafting in the open air appears to be so easily influenced by so many external causes, as frequently to result in entire failure, even in the most skilful hands.

TRAINING.

Young plants should be trained to a single strong shoot, like that represented in Fig. 518, for which purpose a stake should be used and the vine tied up as it advances. Spring plants set out early will often reach a height of six or eight feet by the end of the season.

Cuttings of the first year's growth, as well as layers, are more perfectly fitted for finally transplanting to the vineyard,

by one season's cultivation in nursery rows. During this time they should all be trained to a single shoot, kept upright by staking; the young plants being cut down to two or three eyes when set out, and the strongest only being allowed to grow, rubbing off the others as soon as the young shoots are fairly developed. Pinching off the tips occasionally, after they have reached four or five feet in height, will render the shoot and buds stronger, and the wood will ripen better.

TRANSPLANTING.—This is effected most perfectly by making a broad hole, and rounding up the central portion of the bottom. The stem being cut down to two or three strong buds, and very long roots clipped off, the plant is placed with the centre on the rounded surface of earth, and the roots then spread out in every direction, as shown in the following figure (Fig. 519). The hole is filled with finely pulverized earth, which completes the transplanting.

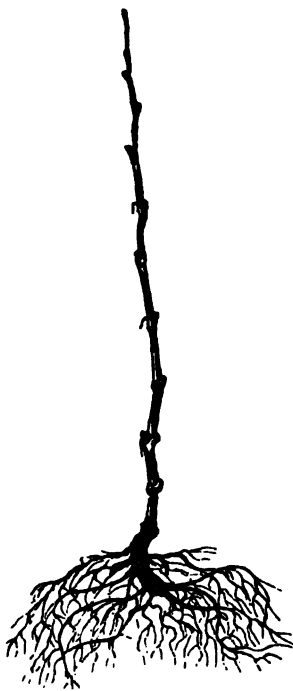


FIG. 518.—One-year Vine.

The following is the usual course for forming the plants into bearing vines—three years being required for this purpose, if strong plants are used and good cultivation given. One or two more years are, however, frequently required, if the growth is not sufficiently vigorous:

First Year.—The plant having been cut down to two or three eyes when set out, the strongest is trained to a single shoot, the others being rubbed off. The tip should be pinched off after growing several feet, to strengthen the cane.

Second Year.—Last year's shoot being cut down to two or three buds, or to a foot or more in height, the same course is

to be pursued; but two shoots, instead of one, are to be grown from the two upper buds.

Third Year.—If the vine is not very strong, cut down these shoots again, and train two new and stronger ones from them, or cut them back part way and raise shoots from the cut ends. If any fruit bunches are produced, remove them early in the



FIG. 519.

season. The best rule to determine whether to cut back again the third year is obtained from the size of the canes, which should not be less than half an inch in diameter. If fully of this size the trellis may be erected, and the training of the vines upon it commenced.

TRELLIS.—Different modes of constructing trellis have been

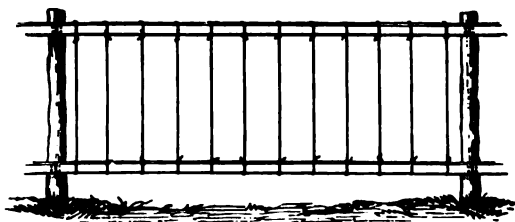


FIG. 520.—Trellis with Upright Wires.

adopted. It is not essential which is used, but the cheapest and most durable is to be preferred. Fig. 520 represents the mode recommended and adopted by Fuller. It is about four feet high, and is intended for a single series of horizontal arms with vertical bearing canes, now generally approved. If two series of arms are desired, the height may be increased to seven feet. It consists of durable posts placed ten or twelve feet apart, to which horizontal rails are nailed, the upper one

at the top and the lower one about a foot from the ground. Between these, vertical wires, about a foot apart, are stretched as shown in the figure. These wires being shorter than when stretched horizontally, need not be so large, and a saving is thus effected in the expense. Each bearing cane is trained to one of these wires.

Another mode is to use wires stretched horizontally, as shown in Fig. 521. The lowest should be eighteen inches or two feet from the ground; the next may be an equal height above, and to these the horizontal arms are tied, each twelve to sixteen inches higher.

Cultivators differ as to the size of the wire suitable to be

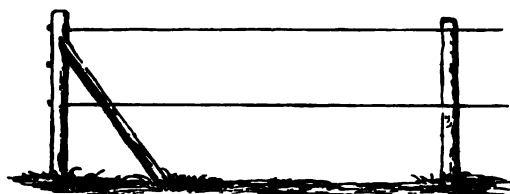


FIG. 521.—Trellis with Horizontal Wires.

employed. Some use even as large as No. 8, which is one-sixth of an inch in diameter, and is thirteen feet to the pound. Others severally employ No. 10, which is twenty feet to the pound; No. 12, which is thirty-three feet, and No. 14, which is fifty-four feet to the pound. For the vertical wire trellis, already figured, No. 16 is large enough, which is nearly one hundred feet to the pound. When the smaller wire is used, it should pass through holes in the end post, and be brought around at the side, and the end twisted around the main part. This may be easily done by using a strong, round piece of wood about a yard long, around which the end is brought, and which by using as a roller and lever combined, easily accomplishes or renews the desired tension.

The wire used for this purpose should be annealed, and is best when galvanized. The wires are fastened to the other posts by staples; or easier by two common nails, with heads touching, the lower one a ten-penny, and the upper a six-penny. Fig. 522.

Trellis made wholly of wood also answers a good purpose,

whether of horizontal bars nailed to posts, or vertical rods nailed to an upper and lower horizontal bar.

TRAINING ON THE TRELLIS.—Whatever mode of training is adopted, the following general rules should be observed:

1. Allow no shoots to grow nearer than about one foot of each other.
2. Cut back each bearing shoot at the close of the season to one strong eye, as near the old wood as practicable, to produce bearing shoots another year.










No. of Feet to One Pound.		Nos.
98		16
72		15
59		14
44		13
34		12
26		11
20		10
17		9
13		8

FIG. 522.—Sizes of Wire for Trellises.

3. Rub off, as soon as they appear, all shoots not wanted.

These rules may be observed for different modes of training, and will succeed well whether in the vertical, horizontal, or in the fan form; but the following mode will commonly be found the simplest and easiest in practice:

After the two canes have been formed the third year on the young vine, as already described, they are to be cut off to within about four feet of the base, and spread out in opposite

directions horizontally, to form the arms. As buds always tend to break into shoots soonest where bent back from an upright position, and also from the extremities or tips of the canes, these arms, if brought out straight, as in Fig. 523, will



FIG. 523.

produce shoots irregularly, the buds on the middle portions of the arms not breaking at all, while the others may have grown several inches. To prevent this difficulty, bend them in curves, as shown in Fig. 524—the middle portions being



FIG. 524.

highest will strike shoots equally with the other parts. As soon as these shoots are well under way, the arms may be brought into a straight horizontal position. If trained to the vertical wire trellis, each shoot should have its appropriate

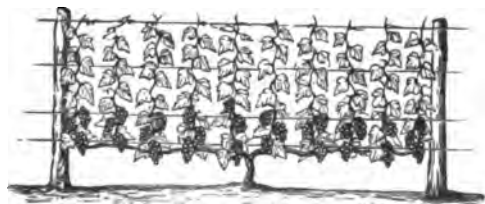


FIG. 525.—Bearing Vine.

wire, and all others be rubbed off. If the horizontal wire trellis is used, each shoot should be tied to the second wire, as soon as it has grown sufficiently to reach it. When the young shoots have reached a few inches above the top of the trellis, they should be kept pinched back to this height, for the rest of the season. Each one will probably set two or three

number for this renewal, the process may be going on annually with but little interference with the general crop. Fig. 530 shows the manner in which this result is effected, the dotted line marking the place where the old spur is cut out on the left, for the benefit of the new shoot on the right.

SUMMER PINCHING.—At every joint of each new shoot is a strong leaf. In the axil (or arm-pit) of each leaf-stalk, buds are formed, which if allowed to remain will grow into fruiting branches another year. Opposite to each strong leaf is a tendril; or in its place a bunch of fruit, if near the base of strong shoots—tendrils being regarded as abortive fruit-bunches, serving also the purpose of clinging to supports and sustaining the vine. These, it will be observed, are opposite the leaf-stalk and bud. From the axil of the leaf-stalk a new and feebler shoot often springs, which is called a lateral—two of which are shown in Fig. 531. Vigorous laterals will sometimes throw out others which are termed sub-laterals. Laterals should be allowed to remain, as displacing them tends to injure or destroy the buds.

To prevent shoots or canes from growing too long, and also for the purpose of increasing the strength of the cane and its buds, the practice of pinching off is adopted, and is generally performed after midsummer. This pinching, giving a check to the cane, tends to the emission of laterals, which should also in turn be pinched at their tips.

It is a common practice with most cultivators of hardy grapes to pinch off the shoots as soon as three leaves are formed above the upper bunch of fruit. A less number will be insufficient to furnish food for the forming berries; a greater number of leaves would doubtless be better, provided there is room on the trellis. A good rule in practice is to allow the bearing shoots, shown in Fig. 525, to pass a few inches above the top wire, before the tips are pinched off. After pinching, the upper bud will frequently "break," or start into a new shoot—in which case a second pinching should be given, and so on as long as the growing season continues.

Summer pruning consists, in addition to this pinching, in rubbing off all useless shoots when they first appear. Bearing canes should be at least ten inches or a foot apart, and all shoots between them are useless and detrimental, by crowding

the foliage, lessening its health and vigor, and drawing strength from the vine. The process of rubbing off is generally begun quite early in summer, or by the time the first shoots are but a few inches in length; and it should be continued or repeated as long as any intruding shoots spring from the vine. If left late, the lopping of large quantities of leaves always injures the vigor of the vine.

MODIFICATIONS OF TRAINING.

But one mode has been described, namely, that represented in Fig. 525. Some cultivators adopt a modification of this



FIG. 532.

plan, by employing a single horizontal arm, extended in one direction only (Fig. 532), instead of the two arms on opposite sides. This mode appears to succeed well, and is regarded

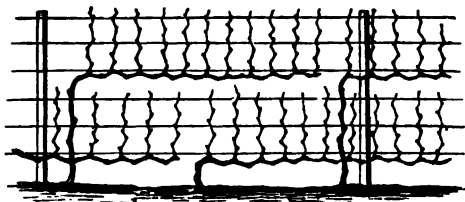


FIG. 533.—Thomery System.

as simpler than the other. Another mode is what is termed the Thomery system, and is represented in the foregoing figure (Fig. 533). Its object is to cover a higher trellis where the ground is limited, or to extend the vine over the walls of buildings. It obviates the difficulty of two or more horizontal arms, one above the other, on the same vine, by allowing but a single arm from each, as will be seen by inspecting the

figure (Fig. 533). Double the number of vines are planted along the trellis, and every alternate one carried up to the second tier. A greater number of vines may be planted, and the trellis raised to a corresponding degree.

SPRAYING GRAPES.

No grower will undertake now to raise grapes without thorough spraying. Anthracnose and mildew and black rot



FIG. 534.—Bagged Grapes.

may not appear, but the chances are too great to risk when the prevention is so easy. For full directions see p. 194.

BAGGING GRAPES.

for a time was practised only by the amateur with a few vines, but the results attained are so manifest and so improve the

market value of the fruit that not a few commercial growers regularly bag their fruit bunches. While the cheapest and thinnest paper bags oftentimes are equally effectual, good stout ones of manilla may be purchased at a low figure. Those commonly used by growers, holding about two pounds, are right. Enclose the bunch as soon as the berries are formed; don't wait for them to grow. Draw the top of the bag together, fold it over the stem of the vine, turn it over, and pin. It may be left thus until the grapes are fully ripe, when they will be found as large, as nicely colored, and much more perfect and handsome than those not so protected (Fig. 534). The illustration is from "Gardening."

SOIL FOR VINEYARDS.

The long-established practice of highly enriching the deep vine borders of exotic grape-houses formerly misled some cultivators into the practice of heavily manuring the ground intended for vineyards of hardy American varieties. It is now fully proved that land of moderate fertility is much better. Rich soils produce a strong growth of canes and leaves, at the expense of the fruit, and render the wood more liable to winter-killing. A considerable proportion of clay in the soil, provided there is a perfect underdrainage, is better than light sand or gravel. The most successful vineyards are planted along the borders of large open waters, where the soil is composed of what is termed *drift*—giving a perfect natural drainage. The south shore of Lake Erie, from Dunkirk to Sandusky, extending a few miles inland, and the borders of Crooked Lake, in Western New York, have proved to be admirably adapted to vineyard culture; and other places in proximity to open water, away from frequent fogs, and with a loose or shelly soil, will doubtless be found equally good.

While such localities as these should be sought for extended or market cultivation, in nearly every portion of the country vines for a family supply may be raised by proper underdrainage, and the selection of hardy or productive sorts.

At the same time that moderate fertility is to be sought, constant cultivation must be given through the growing season. The best managers pass the cultivator once a week.

The slow-growing varieties, such as the Delaware, should have a richer soil than more rapid growers. Grapes on highly manured land will grow larger, and present a more showy appearance—but the fruit at the same time will be more watery, and of inferior flavor.

DISTANCES FOR PLANTING.

The European practice of placing the vines about four feet apart, each way, and training to a single stake, has been adopted to a considerable extent. It succeeds best on poor and light soils, and with the slower growing sorts. Although it does well for a few years, it is not to be generally recommended. Young cultivators also fall into the error of placing their vines too near together, when trained with horizontal arms on a common trellis. They bear and succeed well while young, but as they become older require more room. It is a common practice to place the lines of trellis eight feet apart, and the vines twelve feet from each other, along each line of trellis. This distance appears to answer well; but some of the best managers give at least twelve feet each way, and others as much as sixteen feet. The space thus given not only tends to a more healthy growth and freedom from mildew, but develops larger, finer, and more perfect grapes.

RAISING GRAPES FROM SEED.

NEW VARIETIES.—Procure well-ripened grapes, wash the seed from the pulp, and mix them at once with moist sand or leaf-mould. Bury them in open ground till early spring. They should not be allowed at any time to become dry, and care should likewise be taken to prevent their becoming water-soaked. They should, in fact, be treated as cherry-stones and pear-seeds are managed by nurserymen. Be careful to secure them from mice. Plant in spring, in beds of *deep, rich soil*, in drills a foot or two apart, and an inch or two apart in the drills, and about an inch deep. Shade the young plants for a few weeks. Provide small stakes for their support, and mulch the surface with an inch or so of good fine

manure. If dry weather occurs, give the ground a thorough soaking as often as once a week. Lay down and cover in winter. The great point is a *deep* and *rich* soil, so as to give the young plants a vigorous start.

ARRANGEMENT OF VARIETIES.

CLASS I. *Dark red, purple, or black.*

CLASS II. *Light red or brown.*

CLASS III. *White, yellow, or green.*

CLASS I. *Dark red, purple, or black.*

Adirondac.* Bunches rather large, compact, shouldered; berries medium, round; skin thin, dark, nearly black, covered with a delicate bloom; flesh tender, with little or no pulp, with a mild, sweet, agreeable flavor. Vines and leaves resemble those of the Isabella, and are about as hardy. They are somewhat liable to mildew. Ripening very early, or with the Hartford Prolific, and successful and valuable in warm localities.

Alexander's. (Cape Grape. Schuylkill Muscadell, Spring-Hill Constantia.) Bunches not shouldered, compact; berries medium, nearly round, slightly oval; skin thick, black; pulp firm, coarse, acid until fully ripe. Season late. Worthless in New England and New York; good farther South. A native of Pennsylvania.

Alvey. Bunches medium, loose, shouldered; berries small, round; skin thin, black; bloom thin, blue; flesh without pulp, vinous. A strong grower. Good in quality; not profitable. Pennsylvania.

Barry. (Rogers' No. 43.) Bunch rather large, short, and broad, rather compact, sometimes shouldered; berry large, roundish, black; flesh nearly free from pulp, sweet and agreeable. Rather early, ripening with Concord. Vine a strong grower and good bearer.

Berckmans. Bunch medium, compact, very round, dark wine color; flesh juicy, vinous, rich, pulp tender. A cross between Clinton and Delaware. Very good. Ripens September.

Black Eagle. Bunch large, long, shouldered, not very compact; berry above medium, roundish oval, black; slight bloom; flesh vinous, high flavor, small, tender pulp. Slow grower. Uncertain as to quality in different localities. Ripens in September.

Brighton. Bunch medium or rather large, shouldered, moderately compact; berries full medium in size, round, dark red or maroon when fully ripe, with a purple bloom; flesh tender, pulp slight, quality very good. Vine a vigorous grower, very productive, rather early; valuable. A cross of the Concord and Diana Ham-burgh, and one-fourth exotic.

Brilliant. Bunch large, conical, shouldered, compact; berry large, round, nearly black; flesh sweet, juicy, rich, vinous; pulp tender. A cross of Delaware upon Findly. Ripens a little earlier than Concord.

Catawba.* Bunches medium in size, shouldered; berries large, deep coppery red, becoming purple when fully ripe; flesh slightly pulpy, juicy, sweet, aromatic, rich, slightly musky. Does not ripen well as far north as 43° latitude, except in warm exposures. Very productive.

Cayuga. Bunch small, long; berry medium size, round, inclining to oval, black; light thin bloom; pulp white, juicy, tender. September.

Clinton. Bunches medium or small, not shouldered, compact; berries nearly round, small, black; bloom thin, blue; pulpy, juicy, with a slightly harsh flavor. Very hardy and rather early. Western New York. Requires thorough maturity to develop its flavor. A good keeper.

Concord.* Bunches compact, large, shouldered; berries large, round, almost black, covered with bloom; skin very tender; flesh juicy, buttery, sweet. Ripens ten days before the Isabella; is healthy, vigorous, and very productive. The extreme hardiness, vigor, and productiveness of the vine, and the large size and fine appearance of the bunches and berries, have rendered the Concord one of the most popular market sorts, although inferior to several others in flavor. It succeeds well throughout the entire West. The fruit is too tender for shipping long distances.

Cornucopia. (Arnold's No. 2.) Bunch large, compact, shouldered; berry above medium, black; flavor pleasant, very good; ripens with Concord. A cross of Clinton and Black St. Peter's. Hardy, productive. Said to split badly.

Cottage. Bunch small, sometimes shouldered; berry large, round, black; pulp tough, sweet, somewhat foxy.

Creveling.* Bunches medium, rather loose, shouldered; berries rather large, nearly round, black, with little bloom; flesh with a rather sweet and an excellent flavor. Vine hardy and vigorous. Early—ripens nearly with the Delaware. Pennsylvania. The bunches on the young vines are often quite loose, but afterward become more compact.

Cynthiana. Bunch moderately compact, shouldered; berries small, round, black. Resembles Norton's Virginia, but better. South-west.

Early Victor. Bunch medium, rather compact, often shouldered; berry medium in size, round, black, with a blue bloom; quality

very good. Quite early. Vine hardy, vigorous, and productive; promises to be a valuable early sort. Origin, Kansas.

Eaton. Bunch large, shouldered; berry large, round, black; blue bloom; juicy, tender. Uncertain ripener in some localities. Seedling of Concord.

Elsinborough. (Elsinburgh.) Bunches rather large, loose, shouldered; berries quite small; skin thin, black; bloom blue; pulp none; melting, sweet, excellent. Leaves deeply five-lobed, dark green; wood slender; joints long. Hardy. New Jersey.

Essex. (Rogers' No. 41.) Berry large, tender, sweet; bunch short, shouldered. Ripens with Concord.

Eumelan. Bunch medium in size; berry rather small, black, tender, sweet, excellent. Vine moderately vigorous. A good bearer. Early. Origin, eastern New York.

Hartford Prolific.* Bunches large, shouldered, rather compact; berries rather large, round; skin thick, black, with a bloom; flesh sweet, rather juicy, with some toughness and acidity in its pulp; ripens one week before the Concord. Hardy, vigorous, productive. Valued for its earliness and easy cultivation.

Herbemont. (Warren, Neal.) Bunches large, compact, shouldered; berries small, round, dark blue or violet, with a thick, light bloom; skin thin; pulp none, with a sweet, rich, vinous, aromatic juice. Vigorous grower. Tender at the North. Succeeds well as far south as Cincinnati.

Herbert. (Rogers' No. 41.) Bunch large, round, long, shouldered; berry largest size, round, black; blue bloom; pulp greenish white; juicy, sweet.

Herbert. (Rogers' No. 44.) Berry medium, sweet, a little pulpy; bunch rather loose; moderately productive. Blooms early. Ripens with Concord.

Highland. Bunch large, long, shouldered; berry large, round, black; blue bloom; flesh white, juicy, sweet. Ripens late.

Hosford. Bunches large, shouldered; berry very large, round, black; flesh tender, juicy; flavor sweet. Good. Michigan.

Isabella.* Bunches rather large, shouldered; berries round oval, rather large; skin thick, dark purple, becoming nearly black; bloom blue; tender, with some pulp, which lessens as it ripens; when fully ripe, juicy, sweet, rich, slightly musky. Ripens in favorable aspects as far north as 43° lat., except in cold seasons. Very vigorous; profusely productive. Origin, South Carolina. The *Garrigues*, *Payn's Early*, and *Louisa* claim to be earlier than the Isabella, but differ from it little if any.

Israella. Bunches medium, shouldered, very compact; berries medium, slightly oval, black; flesh tender to the centre, with a peculiar, rich, and pleasant flavor. Early, ripening with Concord. Vine vigorous, healthy, and hardy. Peekskill, N. Y. Keeps well.

Ives. Bunch medium, compact, shouldered; berry rather small, roundish oval, black, with some pulp; of moderate quality; its

chief value for wine. Origin, Cincinnati. Season medium, or rather late.

Lawrence. Bunch large, conical; berry medium, round, purple to black; pulp firm, breaking; flavor sub-acid, free from mildew. Pennsylvania.

Lenoir. Bunches large, handsome, compact, little shouldered; berries small, round; skin thin, dark purple; bloom slight; tender, with no pulp; melting, sweet, excellent. Wood long-jointed; leaf three-lobed. Origin, Carolina. Closely resembles Herbemont.

Logan. Bunches medium, shouldered, compact; berries rather large, oval, black; flesh juicy with little pulp, and a moderate flavor. Vine a slender grower; leaves small, three-lobed. Early.

Merrimack. (Rogers' No. 19.) Bunch medium, rather short; berry large, round, black; flesh tender, sweet, of good quality. Quite early.

Miles. Bunch and berry small; juicy, vinous, good. Hardy; moderate grower; productive.

Milla. Bunch large, long, shouldered; berry large, round, black; thick skin; flesh juicy, rich, vinous.

Missouri. Bunches loose; berries small, round; skin thin, nearly black; tender, sweet, pleasant, with little pulp; moderately productive; growth slow; wood short-jointed; leaves deeply three-lobed.

Mottled. Bunches medium, compact; berries medium, round, mottled, changing to purple; sweet and sprightly, very good. Ripens soon after Delaware; hangs long. Kelly's Island, Lake Erie.

Norton's Virginia.* Bunches long, moderately compact; berries small, round; skin thin, dark purple; pulpy, vinous, somewhat harsh, rather pleasant and rich. Shoots strong, hardy. Mostly grown at the South and West for making wine.

Ohio. (Longworth's Ohio, Segar-Box.) Bunches large, long, loose, tapering, shouldered; berries small, round; skin thin, purple; bloom blue; tender, melting, sweet, excellent, with no pulp; a good bearer. Shoots long-jointed, strong; leaves large, three-lobed. Origin unknown. As far south as Cincinnati it succeeds well, but tender farther north.

Raabe. Bunches small, compact, rarely shouldered; berries small, round, dark red; thick bloom; flesh very juicy, scarcely any pulp. Good. Philadelphia.

Senasqua. Bunch medium, sometimes large, compact; berry medium, purplish black, tender, juicy, free from pulp, becoming sweet when fully ripe. Very good. Origin, Croton Point, N. Y. A cross of Concord and Black Prince.

Telegraph. Bunch above medium, compact; berry rather large, round, black, juicy, with some pulp, of moderate quality, valuable for its earliness (ripening about the same time as Hartford); vine hardy, vigorous. Origin, near Philadelphia.

To-Kalon. Bunches large, shouldered; berries varying from oval to oblate, dark, with a bloom; sweet, excellent, without foxiness, toughness, or acidity. Perfectly hardy, and with good treatment an early and abundant bearer. A little earlier than the Isabella. Lansingburg, N. Y. Liable to rot, and variable in ripening and quality.

Union Village. (Ontario.) Bunches very large, compact, shouldered; berries very large, round; skin thin, black, with a bloom; sweet, with a pleasant, moderate flavor. A good and very showy sort; rather tender at the North.

Wilder.* (Rogers' No. 4.) Bunch large, compact, shouldered; berry large, round, black, with a thin bloom; flesh tender, with a little pulp, sweet, slightly aromatic, of good quality. Ripens with Concord. Succeeds in many localities.

Worden. Resembles Concord, but rather larger, superior in quality, and ten days earlier. Valuable.

CLASS II. *Light red or brown.*

Agawam. (Rogers' No. 15.) Bunch large, moderately compact, and shouldered; berry large, nearly round, dark dull reddish-brown; flesh tender, little pulp, very slightly partaking of the foxy aroma; of good vinous flavor. Season medium, or soon after Concord. Vine a strong grower and great bearer, but the fruit easily affected by rot.

Amber Queen. Bunch medium, open, tapering; berry large, round, light red; thin bloom; pulp tender, juicy, sub-acid, rich. Promises well.

Bland. (Bland's Virginia, Powell.) Bunches loose; berries round, pedicles long; skin thin, pale red; flesh slightly pulpy, pleasant, delicate, sprightly. Late. Rarely ripens well as far north as 43° lat. A moderate bearer. Origin, Virginia.

Delaware.* Bunches small, compact, generally shouldered; berries smallish, round; skin thin, light red, translucent; exceedingly sweet, aromatic. Early. A vigorous grower under high culture; requires a strong, rich soil. An early and profuse bearer. Hardy. Delaware, O. One of the most excellent and popular of all American grapes, especially at the North and East. Often injured by overbearing.

Diana.* A seedling from the Catawba, which it resembles, but paler, or a pale grayish red. Bunches compact; berries round, almost without pulp, juicy, sweet, rich. It ripens best on poor soils. Origin, Milton, Mass.

Catawba, see last class.

Diana Hamburg. Bunches large, compact, shouldered; berries large, round, dark red when fully ripe, tender, free from pulp, sweet, aromatic. Season between Concord and Diana. Raised from seed of the Diana impregnated with Black Hamburg, by J. Moore, Rochester, N. Y. A slow grower.

Early Golden Campbell. Bunch rather small, cylindrical; berry below medium, oval, yellow; flesh white, juicy, vinous. A seedling of Moore's Early.

Goethe. (Rogers' No. 1.) Bunch rather large, moderately compact, shouldered; berry quite large, oval, yellowish green, often more or less blotched or shaded dull red; flesh tender, with no pulp, sweet, slightly aromatic, and when well ripened of excellent quality. Rather late, occasionally ripening well at the North, better at the South. Vine vigorous and productive. This has more of the exotic character than any other of Rogers' hybrids, and therefore less reliable and more subject to mildew.

Iona. Bunches large, shouldered, not compact; berries medium, round, pale red, becoming dark red at maturity; flesh tender, with little pulp, and with a rich, slightly vinous, excellent flavor. Peekskill, N. Y. Fails in most localities, and often much injured by overbearing.

Jefferson. Bunch rather large, shouldered, compact; berry full medium in size, roundish oval, light red, quality excellent. Vine healthy and vigorous, and very productive. Season medium. Raised by J. H. Ricketts, Newburg, N. Y.

Lindley. (Rogers' No. 9.) Bunch medium in size, rather long and compact; berry medium, nearly round, reddish, sweet, slightly aromatic, very good when well grown. Rather early. Vine vigorous and productive.

Massasoit. (Rogers' No. 3.) Bunch medium, rather loose; berry rather large, roundish, light red, sweet, good. Early, a little before Concord. Vine moderately vigorous.

Michigan. Bunches large, often two-shouldered; color resembling Catawba, but redder, juicy, sweet, rich, with a fine perfume. Ripens two weeks before Catawba.

Northern Muscadine. Bunches small, short, compact; berries medium, round, brownish red; skin thick, with the character and odor of the brown Fox grape. The berries fall from the bunch as soon as ripe, which is about one week before Concord. New Lebanon, Columbia County, N. Y. Valuable only for its earliness and extreme hardiness.

Salem. (Rogers' No. 22.) Bunch large, short, rather compact; berry large, round, dark dull red; tender, nearly free from pulp, of a moderate but very agreeable flavor. Season medium. Vine vigorous and productive. Succeeds in many localities, mildews in others.

Scuppernong, see next class.

Venango. Bunches compact; berries fine lilac; pulp tough, but with a peculiar, aromatic flavor, which makes it valuable for kitchen use. Two weeks before Catawba. Vigorous. Hardy.

Walter.* Bunch moderate in size, shouldered, compact; berry medium, round, light red; skin thick; flesh sweet, aromatic, of excellent flavor. Season medium. Origin, Poughkeepsie, N. Y. A cross of Delaware and Diana.

CLASS III. *White, yellow, or green.*

Allen's Hybrid. Bunches rather large, shouldered, compact; berries medium, round; skin thin, pale amber when fully ripe; flesh tender, without pulp, with a sweet, rich, delicious flavor. A hybrid between native and exotic species. Moderately hardy. Much liable to mildew. Season medium.

Anna. Bunches large, loose, shouldered; berries large, white, with a thin white bloom; flesh tough at the centre; juice between pulp and skin sweet and excellent. October—too late for ripening at the North. A seedling of the Catawba.

Cassady. Bunches medium, compact, sometimes shouldered; berries small, round, greenish white, sometimes with a pale amber blush; flesh juicy, little pulp, flavor pleasant, good. Philadelphia. Strong grower. Leaves woolly beneath. Fails in some localities.

Clara. Bunches medium, loose; berries medium, round, green; flesh tender, juicy, rich, sweet, and delicious. Philadelphia. Of foreign parentage.

Croton. Bunch medium in size, not very compact, shouldered; berries varying from small to medium, light greenish yellow; skin thin; flesh juicy, sweet, with an excellent pleasant flavor. Ripens early. A cross of the Delaware with the Chasselas. Liable to mildew in some localities.

Cuyahoga. Bunches medium, shouldered, compact; berries rather large, round, pale greenish white; bloom thin; flavor moderate. Too late for the North and liable to mildew.

Duchess. Bunch medium, sometimes large, shouldered; berries moderate in size, light green, tinged with pale yellow and amber; tender, free from pulp, sweet, rich, and excellent in quality. One-fourth exotic. Season medium. Ulster County, N. Y.

Empire State. Bunch rather large, shouldered; berry medium, yellowish white, rich, sweet, sprightly, very good. Early. A cross of Hartford and Clinton. Newburg, N. Y. A promising new sort.

Green Mountain.* (Winchell.) Bunch small, compact, sometimes shouldered; berry medium, oval, greenish white; thin bloom; pulp tender, juicy, very sweet and rich. Free from rot and mildew. The berries hang well to the stems. An excellent grape with a future.

Green's Golden. Bunch medium, long stem, compact, regular; berry large, round, greenish white, very juicy, acid. A handsome grape. Poor shipper.

Hayes. Bunch medium, cylindrical, shouldered; berry below medium size, round, yellowish white; pulp rich, juicy, vinous.

Lady Washington. Bunch quite large, shouldered; berry medium, round, pale greenish yellow, often tinged with pink, quality medium. Season rather late. A cross of Concord and Allen's Hybrid, and one-fourth exotic. Variable. Newburg, N. Y.

Lydia. Bunches above medium; berries large, oval, greenish white, with a tinge of rose in the sun; sweet, excellent. Ripens with the Delaware. C. Carpenter, Kelly's Island, O.

Martha. Bunches medium, rather loose, shouldered; berries large, round, pale yellow; slightly pulpy, sweet, juicy, a little foxy. Vine a hardy, healthy, and strong grower. A seedling of Concord.

Mary. Bunches quite large, loose; berries medium, round, nearly white, translucent; flesh tender, little pulp, sweet and sprightly, very good. Rather late. Kelly's Island.

Maxatawney.* Bunches medium, moderately compact, not shouldered; berries light greenish yellow, tinged with amber; flesh tender without pulp when ripe, quality excellent. Vine hardy. Ripens rather late. The Maxatawney much resembles the Rebecca in flavor and general appearance; but while it is hardly equal to the latter in quality, it is a better grower. Berks County, Pa.

Niagara.* Bunch rather large, slightly shouldered; berry nearly round, pale green becoming partly yellow, medium in quality. Vine possessing great vigor and productiveness. A cross of Concord and Cassady. Lockport, N. Y.

Pocklington. Bunch medium, shouldered, compact; berry large, pale greenish yellow, pulpy, with good flavor when fully ripe. Season rather late. Vine hardy, healthy, productive. A showy and attractive grape. A seedling of the Concord. Origin, Sandy Hill, N. Y.

Prentiss. Bunch medium, sometimes shouldered, compact; berry medium, roundish oval, greenish white becoming tinged with pale yellow, sweet, and very good in quality. Slow grower. Season medium. A seedling of the Isabella. Steuben County, N. Y.

Rebecca.* Bunches nearly cylindric, compact, heavy, often shouldered; berries, medium, oval; color light green in the shade, golden in the sun, with a light bloom, somewhat translucent; flesh juicy, sweet, delicious. Ripens nearly with Concord, and keeps a long time. When fully ripe, one of the finest flavored of all grapes. Moderate grower. Foliage tender. Hudson, N. Y.

Scuppernong. (Fox Grape or Bullet Grape of the South, American Muscadine.) This is a distinct Southern species, the *Vitis vulpina*. Bunches very small, loose; berries round, large; skin thick; pulpy, juicy, sweet, strongly musky. The "White" is light green, the "Black" dark red; the color of the tendrils corresponding in each variety. Leaves quite small, glossy on both sides. Very tender at the North.

Taylor's Bullitt. Bunches medium, loose, with many imperfect berries; berries rather small, greenish white, of moderate quality. A strong grower. Kentucky.

CHAPTER XXV.

THE MULBERRY

Has generally been planted as an ornamental tree, but with exception of Teas' drooping mulberry the varieties are generally too irregular and spreading in growth to compete with other trees not possessing their fruit-bearing advantages.

To many the flavor of the mulberry is not attractive, but to others its rich sub-acid sweetness and the long continuance of its season commend it to favor.

Probably no fruit has been so neglected as the mulberry. The Chinese have cultivated the tree from time immemorial as food for the silkworm, and the craze which spread over this country fifty years ago in the same direction is a matter of history.

The berries are of varying size and color, largest on old trees.

The varieties worthy of cultivation are not numerous, and are mostly not hardy in the North. The practice of substitution is so common among nurserymen that it is not easy to obtain trees true to name. It will grow in any well-drained soil, but appears to prefer one which is rather light and gravelly. At full size the trees are twenty to thirty feet high, with round open heads; the berries as they mature drop off and may be gathered from the ground. A slight jarring will shake the ripe ones off, and this is the best mode of gathering them.

The most complete monograph on the mulberry is that of Prof. L. H. Bailey of the Cornell Experiment Station of New York. He classifies those grown in America thus:

1. The White Mulberry group.—*Morus alba*.
 1. (a) Russian mulberry.—Var. *Tatarica*.
 1. (b) Nervosa mulberry.—Var. *venosa*.

2. The Multicaulis group.—*Morus latifolia*.
3. The Japanese group.—*Morus Japonica*.
4. The Black Mulberry group.—*Morus nigra*.
5. The Red or Native Mulberry group.—*Morus rubra*.
5. (a) Lampasas mulberry.—Var. *tomentosa*.

He says: "Mulberries can be propagated by cuttings of the ripe wood or of roots. Cuttings start best under glass. Some nurserymen propagate by short cuttings indoors, starting them in February or March. The cheap Russian mulberry stocks, from the West, have supplanted cutting-propagation very largely. The named sorts are grafted upon these Russian roots in winter, with fair success, in the same manner in which apple-trees are root-grafted, or they are sometimes crown-grafted, the stocks for this purpose being grown in pots or boxes. Ordinary fall budding in the field is not successful with mulberries, but spring budding gives good results. Spring budding has been employed and recommended certainly for thirty years, but it does not yet appear to be a common practice. S. D. Willard, Geneva, N. Y., who grows quantities of mulberries, has several times shown me his stock, which is propagated by spring scion-budding. This is performed just before the foliage is out, or as soon as the bark slips freely. Fig. 74 explains the operation. The incision in the stock is the same as for the ordinary fall budding. The scion carries one or two buds, and is cut upon one side only. This prepared side is inserted next the wood in the stock, and is held in place by string, as for fall budding."

VARIETIES.

Downing.* (*Downing's Everbearing.*) Large, black, sub-acid. Prolific, but not entirely hardy in Northern States. A valuable sort, not readily obtained, as New American is commonly substituted for it. The leaf of the latter is smaller and not so pointed. Fig. 535.

Hicks. (*Hicks' Everbearing.*) Medium, very sweet, insipid. Tree vigorous and a profuse bearer. Season extends over three or four months. Georgia. Fig. 536.

Johnson. Very large, black, two inches by three-fourths of an inch, sub-acid. Tree strong, irregular, poor bearer. Ohio. Being superseded by other varieties.

New American.* Large, from one to two inches long, glossy. Tree strong, vigorous, very productive, hardy. Fruit begins to ripen in June and continues into September. The best variety for Northern States. Fig. 537.



FIG. 535.—Downing Mulberry.



FIG. 536.—Hicks.



FIG. 537.—New American.

Stubbs. Large, two inches by three-quarters, deep black, rich, sub-acid. Extremely prolific. Very valuable. Georgia.

Teas' Weeping.* Fruit small, reddish, of little value, but the tree is so very pronounced in its weeping habit that it is desirable as an ornament for lawns. Tree dwarf, slow grower. Russia.

CHAPTER XXVI.

NECTARINES.

THE Nectarine being nothing more than the peach with a glossy skin, the same rules for cultivation will apply equally to both (see Chapter XXVIII.), with the exception that, as its smooth surface renders it eminently liable to the attack of the curculio, special attention must be given to the destruction of this ins. ct.

The nectarine is usually inferior, and has more of the *noyau* flavor than the peach, and the shoots are of smoother and more compact growth.

DIVISION I.—FREESTONES.

CLASS I. FLESH PALE.

Section I. Leaves with reniform glands.

Downton.* Medium in size, roundish-oval, pale green, with a deep violet-red cheek; flesh pale green, slightly red at the stone, melting, rich, excellent. Ripens end of summer. Flowers small. English.

Duc de Telliers. Rather large, roundish-oblong; apex slightly narrowed; base broad, pale green, with a marbled purple-red cheek; flesh pale red at the stone, juicy, sweet, good. Flowers small. Rather early, or end of summer.

Early Violet.* (Violet Hative, Aromatic, New Scarlet, Large Scarlet, Early Brugnion, Violet Musk, *Violette Musquée*.) Size medium, roundish; apex slightly narrowed; suture shallow; skin with a dark purple-red cheek and brown dots, on pale yellowish-green; flesh whitish, much reddened at the stone; stone roundish, moderately rough, reddish or reddish brown; flesh melting, rich, high-flavored, and aromatic; of the finest quality. Season medium or end of summer. Flowers small. Distinguished from Elruge by its redder flesh and stone, and darker skin. The *Large Early Violet*, or *Violette Grosse*, differs in its larger size and rather inferior flavor.

Elruge.* Medium in size, roundish-oval, suture slight, distinct at apex; skin a dark red or deep violet on a greenish-yellow ground, with minute brownish dots; flesh greenish-white, slightly, sometimes scarcely stained with pale red at the stone; juicy, rich, high-flavored; stone rough, pale. Flowers small. Season about medium, or first of autumn. This is one of the best and most celebrated of nectarines.

Hardwicke Seedling. Large, roundish, approaching oval, resembling Elruge; skin with a violet-red cheek on pale green; flesh greenish white, slightly reddened at the stone, juicy, rich, high-flavored. Flowers small. Season medium, or end of summer. English.

New White. Rather large, nearly round; skin white, often a slight tinge of red; flesh white, tender, juicy, rich, vinous; stone small. Flowers large. Season medium, or first of autumn. English. The *Old White* resembles the preceding, but is less hardy and productive.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves serrate, without glands.

Hunt's Tawny. Nearly medium size, roundish-ovate, narrowed and pointed at apex, one side slightly enlarged; skin a dark red cheek on pale orange, with numerous russet specks; flesh deep orange, rich, juicy, good. English. Flowers small. Valuable for its early maturity, ripening quite early, or three weeks before the close of summer. Often mildews badly.

Section II. Leaves with reniform glands.

Boston.* (Perkins, Lewis.) Large, handsome, roundish-oval; bright yellow, with a deep red cheek; flesh yellow to the stone, with a good, pleasant, but not very high flavor. Flowers small. Season medium, or about the first of autumn. A native of Boston.

Pitmaston Orange. Large, roundish ovate, base broad, apex narrow and pointed; surface with a dark reddish cheek, slightly streaked at the margin, on rich orange; flesh deep yellow, red at the stone, juicy, rich, fine. Flowers small. Stone rather small. Rather early.

DIVISION II.—CLINGSTONES.

CLASS I. FLESH PALE.

Section I. Leaves serrate, without glands.

Early Newington.* (Black, Early Black, Lucombe's Seedling.) Large, roundish ovate, one side slightly enlarged, apex pointed; skin pale green, nearly covered with bright red and with darker marblings and dots; flesh greenish white, deep red at the stone, juicy, with a fine, rich flavor. Flowers large. First of autumn.

Newington. (Scarlet Newington, Scarlet, Old Newington, Smith's Newington, Anderson's.) Rather large, roundish; nearly covered with red and darker marblings, on pale greenish yellow; flesh deep red at the stone, juicy, rich, vinous. Rather late. Flowers large. Best when ripened to shrivelling.

CLASS II. FLESH YELLOW.

Section I. Leaves with reniform glands.

Red Roman. (Roman, Old Roman, Brugnion Musquée.) Large, roundish, a little flattened at apex; skin greenish-yellow, with a somewhat rough, dull reddish-brown cheek, with brown russet specks; flesh firm, greenish yellow, deep red at the stone, rich, vinous, high flavored. Flowers large. Season medium or rather late.

CHAPTER XXVII.

NUTS.

THE introduction of mainly Japanese varieties of chestnuts and walnuts has created an interest in the growth of our native nuts, too long delayed, which will unquestionably contribute much to pleasurable and profitable cultivation of land.

In this country a crop of nuts of any value has heretofore been generally considered an adventitious, an accidental wind-fall, to be prized by the lucky owner of a tree which produces fruit of unusual size and in large quantity. Few attempts have been made to propagate from such trees, and when it has been, it has usually resulted in complete failure.

Nut trees have been treated as one would an apple, or peach; transplanted trees invariably died and grafted ones fared no better. Within the past few years more careful study has been made of the difficulties which have heretofore discouraged experiments in this direction.

It is not at all so easy a matter to raise any of our native nuts as it is the soft fruits. Unless nursery grown, and that properly too, they are all intolerant of removal, and grafting is too commonly a failure; besides this, they do not come into bearing, excepting in the Southern States, until of considerable age.

Notwithstanding the inherent and persistent character of some of these drawbacks, the results to be obtained fully justify the necessary care and skill which will in a measure overcome them.

A new and most interesting, valuable, and pecuniarily profitable industry is within reach of all who will avail themselves of it.

So new is it that practically it has no nomenclature. Here and there have appeared in the market, from year to year,

some enormous hickory nut, an immense chestnut, a nearly finger-long pecan, the product of some unknown tree, "back in the country," but save for its annual appearance and immediate sale at a big price, the unknown has remained unlocated and unnamed. Consequently the list of identified varieties is very small. It will doubtless increase with rapidity.

While the extraordinary size and appearance of nuts, as in soft fruit, will always have a favorable influence in their sale, it should not be overlooked that it is often the case that small nuts may have proportionately larger meats and be of sweeter and higher flavor than larger ones. Each variety should be judged upon its individual merit.

Wherever there is a tree which produces nuts which possess apparent superiority over others, the owner should send specimens, with the fullest description of the tree, its probable age, location, and peculiarities to the Agricultural Experiment Station of his State (see p. 222), and thus aid in the development of this new industry.

PROPAGATION.

It is generally conceded that the surest way to grow nut trees is to plant the nuts. As with all other trees, this is not, after all, the slowest way to obtain good, healthy, long-lived trees. The height that even the slow-growing hickory will reach at two years, if properly managed, will astonish most.

The vitality and germinating power of nuts is greatly impaired by loss of moisture, so that but a small proportion will sprout if kept out of ground and not planted until the following spring. Gather them as soon as they fall in the autumn, spread them upon the ground, cover with three or four inches of sand, and upon that as much nice loam. Under this covering, exposed to the weather, a large percentage will keep in good condition through the winter. As soon as the ground can be worked take them out and plant in rows, about six inches apart. The following spring dig them up, cut off about one-half of the tap-root and plant again. The next year follow the same course, and the third year plant out where

they are to remain. The length of the tap-root of a one- or two-year-old hickory or pecan is something wonderful, and readily accounts for the difficulty of successfully transplanting them, either from the fields or nursery. It is commonly two or three times as long as the shoot above ground, and as received from nurserymen it is more often as bare of fine roots as a parsnip. It is little wonder then that sometimes it stands dormant and seemingly dead through the whole of the first season, to start slowly into growth the second summer after transplanting. Rich soil, good cultivation, with shortening of the tap-root as above directed, should give a good growth of fibrous roots while in the nursery rows, and conduce to successful subsequent transplanting.

This method will usually produce strong, vigorous young trees. The drawback to this method is that nut trees do not come absolutely true from seed; at the same time a good stock is likely to reproduce most of its good qualities.

Mr. E. H. Van Deman, late U. S. Pomologist, says: "The variation of seedlings is so great that, with nuts as well as other fruits, the only sure method of reproducing a variety is by budding or grafting. This is a more difficult operation with nut-bearing trees than with most others. However, it can be done, and with each year we are learning better how to do it.

At present the best-known method is to work upon one- or two-year-old seedlings, either in nursery rows or where seeds have been planted in the orchard. They should be cut some two or more inches below the surface of the ground, or just above where the roots begin to swell, and a scion inserted not less than five or six inches long and having a terminal bud if possible. The "tongue" graft is the best for small stocks. No wax is needed for this underground grafting, but some bandage should be used to hold the parts firmly in place. Cotton strips dipped in hot grafting-wax and then dried are very good. A ball of wet clay may be pressed about the wound and the earth packed to near the top of the scion to stop evaporation. A very important point, and one that must not be overlooked, is that the scions should be cut early, before any signs of starting, and put in some cool, damp place until after the stocks have begun to grow. In the sawdust of an

ice-house is a safe place, or buried in earth where the sun will not warm it early; otherwise they are apt to start too early.

Prong Grafting is recommended by B. M. De Long, in the excellent monograph on nut culture, just issued by the U. S. Department of Agriculture,* as follows:

"In this method the prongs or extremities of the branches are used. Fig. *a* represents the scion or prong used, and the



FIG. 538.—Prong Grafting.

method of cutting it from the branch. The prong is cut as illustrated, and the wood on the prong (graft) is partly removed, being gouged out with the point of the budding-knife. This is done to allow the inner bark of the bud to unite with the inner bark of the stock, which union would be prevented if the wood should be allowed to remain in the bud. After the wood on the bud has been partly removed, as shown in Fig. *b'*, the stock is cut off with a sharp saw, smoothed over with a knife, and the graft inserted as shown in Fig. *c*, and tied tight; no less than eighteen-ply twine should be used. The cuts are waxed over with grafting-wax. After the grafts have started they should be examined and if the twine is found to begin to cut into the stocks it is untied and tied on again; this will prevent further injury. The object of allowing the twine to remain a longer time is to prevent the cut

* "Nut Culture in the United States, Embracing Native and Introduced Species." Report by S. B. Heiges, Pomologist. Large octavo, pp. 147, 16 plates. U. S. Department of Agriculture, Division of Pomology, Washington, Government Printing Office.

bark from warping open by the action of the atmosphere, thus causing the graft to die."

Cleft Sap Grafting.—As this differs somewhat from cleft grafting as described on page 33, and is claimed by Felix Gillet, of California, to succeed with walnuts, his method is thus described: "If done early in the spring when the sap is commencing to flow, it can be used on limbs as large as three and

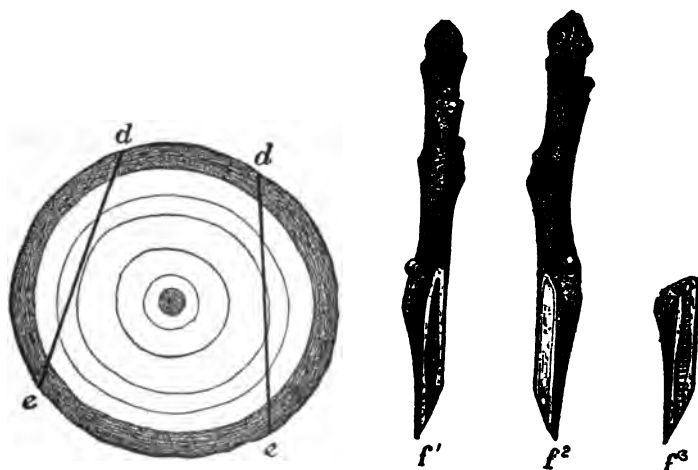


FIG. 539.—Cleft Sap Grafting.

a half inches in diameter. The stock is sawed off and smoothed as for ordinary cleft grafting. Instead of making a single cleft through the centre, two are made, one across the stub at each side of the centre (Fig. *de, de*) the cleft thus being in sapwood, instead of through the heartwood and pith. The scion is prepared as for ordinary cleft grafting, except that the sloping cuts are so made that but one scarf exposes the pith (Figs. *f'*, *f''*, *f'''*). After the insertion of the scions the cut surfaces left exposed are thoroughly waxed, and the stock is well bound with cotton cloth to prevent it from opening and drying out."

Hickories and walnuts can be budded by the annular process (page 44), working upon one- or two-year-old seedlings, and probably with much less percentage of loss than by any

kind of grafting. Chestnuts may be grafted, however, in favorable seasons with a loss of not over twenty-five to fifty per cent, by the "cleft" process (pages 33 and 378). Two or three year old seedlings, or young sprouts, are most favorable subjects; put the graft in high up, so that the native stock shall form the trunk of the tree.

As soon as specific varieties are demanded nurserymen will have recourse to all these methods.

Native walnuts, pecans, and hickories do not bear much before they are fifteen or twenty years old. Chestnuts usually bear at about ten or twelve years; foreign varieties bear earlier, as do all budded and grafted trees, but then they are always shorter-lived. In the Southern States most nut trees will produce crops in five or six years.

CHESTNUTS.

NATIVE VARIETIES.

THE American Sweet Chestnut is the only one really entitled to be called sweet; it is much superior in flavor to both the European or Japanese kinds, though as yet it cannot approach



FIG. 540.—Murrell.



FIG. 541.—Native Chestnut.

either in size. Nevertheless, in the few years only it has begun to attract attention some wonderfully large nuts have been discovered. Chestnuts are so much easier to propagate than other nut trees, come into bearing so much earlier, and command such highly remunerative prices that their cultivation is not likely to be neglected much longer. The tree is indigenous all over the eastern United States, growing luxuriantly on rocky, gravelly hillsides. It does not do well on

limestone, or clayey soil, nor will it flourish in wet, boggy land. The young seedlings are characterized by their long tap-root, and therefore unless the nuts are planted where the trees are to grow they must be treated as described on page 375.

When chestnut groves are cut for the timber, sprouts or scions spring up with rank growth from the stumps. A fruit-



FIG. 542.—Wild (abundant yield).



FIG. 543.—Wild Chestnut.

ing orchard may be had earlier than from seedlings by cutting away the sprouts sufficiently to give ample room to those which are left to form good bushy heads, and budding or grafting those left. However, owing to the difficulties attending either of these operations, according to the Pennsylvania State College Agricultural Experiment Station but seventy-five per cent can be expected to be successful. It is better to graft all the strongest shoots and thin out, after it is found which have succeeded in making perfect unions and are growing vigorously.

STORING chestnuts either for market purposes or for home use requires attention as soon as the crop is gathered. Put them in any suitable tub and pour boiling water over them until the nuts are covered. Stir them with a stick to insure thorough scalding. The wormy ones will float and may be gathered off the surface. Allow the others to remain fifteen or twenty minutes, after which spread them out until perfectly dry. They may then be stored in bags or barrels until wanted, and will be found to keep much better than if not subjected to the scalding process. The meat will be less horny and hard.

In the chapter on chestnuts in the monograph on nut culture of the U. S. Department of Agriculture, some seventeen varieties are named, but as it is improbable that any of these are in the hands of dealers—being as yet only local—it is hardly worth reproducing them here.

Those who desire to obtain trees of native chestnuts must still themselves search out those of exceptional merit.

FOREIGN VARIETIES.

French, Italian and Spanish chestnuts have long been imported in moderate quantities and sold at high prices in the

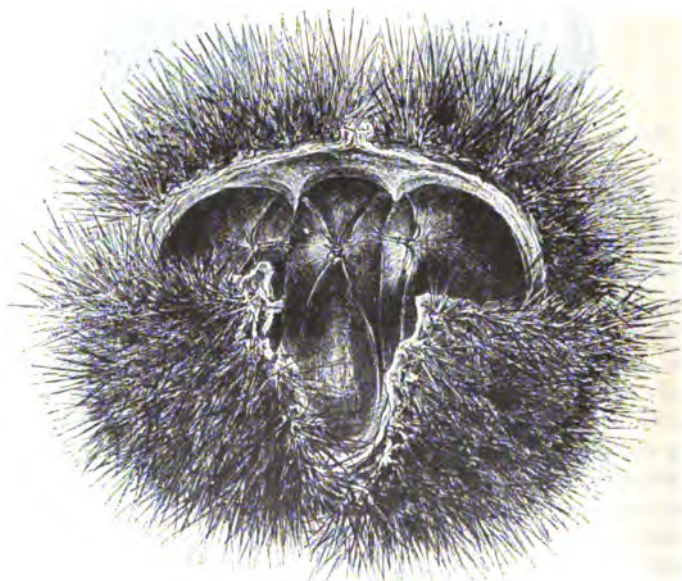


FIG. 544.—Tamba-guri (reduced one-half).

fruit stores. Abroad they are highly prized as an article of food and are largely consumed by all classes. They lack the sweetness of the American chestnut and the meat is enveloped in a tough and sometimes bitter skin. In some varieties this skin is readily removed, while in others it follows the convo-

lutions of the nut deep into its centre. The French, Spanish, and Italian chestnuts are of the same stock. The trees are strong growers, introduced originally into Europe from Asia Minor. The nuts vary considerably in size and in quality. They are usually large, oblate conical in shape, the scar small compared with that of the Japanese varieties, in which latter it sometimes covers nearly half the shell. These nuts are hardly worth cultivating in the United States, the greater promise of the newly introduced Japanese varieties of chestnut (Guri) being much more attractive, although they have not as yet proved so hardy as their European congeners. The wild chestnuts of Japan annually produce large crops of nuts about an inch in diameter—the variety known as Tama-guri (Mountain Chestnut) being highly esteemed by the Japanese. The tree is some thirty feet high. The cultivated sorts are of many varieties, the largest of all being the Tamba-guri (Fig. 544). These trees grow thirty to sixty feet high.

All of these foreign chestnuts compensate in a measure for their inferior flavor to our native sorts, by their greater size and the earlier bearing of the trees. They are furthermore very prolific.

Grafting these great nuts upon American stocks will probably add to their hardiness and vigor.

VARIETIES.

Advance. Large, smooth, dark. Tree vigorous, productive, bears early. Ripens last of September. Japan.

Alpha. Large. Tree vigorous, regular, and prolific bearer. Earliest to ripen. Japan.

Bartram Late. Medium, bright color, three to a burr. Ripens middle of October. Europe.

Black. Large, dark color, productive. Ripens last of September. Japan.

Dager. Large. A seedling of Ridgeley. European.

Early Reliance. Medium, smooth, bright. Tree dwarf, spreading, bears early. Ripens last of September. Japan.

Eureka. Large, quality above average. Tree rapid grower, spreading habit. Not hardy North. European.

Felton. Large, sweet, good flavor. Japan.

Giant. (Parry's Japan Giant.) Very large, smooth, dark-colored; one or two nuts only in a burr. Tree vigorous, upright grower. Fig. 545. Japan.

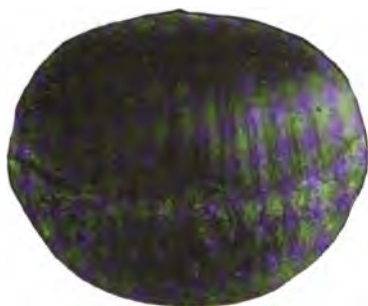


FIG. 545.—Japan Giant.



FIG. 546.—Numbo.

Hannum. Large, bright, regular and productive. Ripens early. European.

Kerr. Dark, three to a burr. Tree enormously productive. Japan.

Killen. Very large, handsome, superior quality. Japan.

Mammoth. Very large. A seedling of Giant. Japan.



FIG. 547.—Paragon.



FIG. 548.—Ridgeley.

Numbo. Medium, smooth, bright. Tree vigorous, hardy, regularly productive. Does not bear early. Fig. 546. European.

Paragon. Large, sweet, good flavor. Tree bears young and abundantly. Fig. 547. European.

Parry's Superb. Large, bright, smooth. Tree strong grower and enormously productive. Japan.

Ridgeley. (Dupont.) Medium, sweet flavor, excellent. Tree hardy. Fig. 548. European.

Success. Large, handsome nut. Tree vigorous and productive. Japan.

THE CHINQUAPIN

Is really a dwarf chestnut, which grows wild in various localities on the eastern seaboard from Pennsylvania to the Gulf. Usually a small spreading bush four to ten feet high, varieties are sometimes found which form trees from thirty to sixty feet in height. The nuts of the Eastern States are ovoid conical, dark mahogany color, very handsome, and the meat is sweet and good. The chinquapin of the Pacific coast nearly resembles in appearance a small chestnut. The bushes will thrive and appear

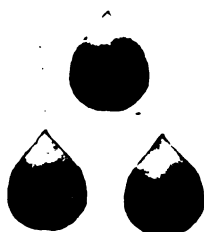


FIG. 549.—Eastern Chinquapin.

entirely hardy as far north as New York.

HAZELNUTS.

The cultivation of this nut is almost wholly neglected in this country, and while the native bushes abound, the crop and the



FIGS. 550 and 551.—Native Forms of Hazelnuts.



FIG. 552.—"Istrian" (an imported nut).

nuts are usually so small that they rarely appear in market. The imported filbert has complete possession, and until some method of overcoming the difficulty of its culture in the United States is discovered, we are likely to be dependent upon foreign growths for supplies of this nut.

The bushes are easy of cultivation and will often apparently flourish, but they fail to bear fruit and the bushes are liable to a disease which eventually kills them. The late Mr. N. S. Fuller had probably more experience in growing filberts than any other man in America, and his recent book on Nut Culture gives in detail his experiments and failures.

In the States west of the Rocky Mountains the hazel becomes a tree of fifty or sixty feet, and is said to bear large crops.

The following description of the propagation, etc., of the filbert is taken from "Nut Culture in the United States:"

"Propagation.—Propagation is effected by seed, by layers, by suckers, by cuttings, and by grafting or budding. Grown from suckers, trees come earliest into bearing, and by some are claimed to make the strongest trees; but the major portion of hazel trees produced in nurseries are from cuttings, made eight or ten inches in length, from last year's wood. They root as readily as gooseberries. A moist, not wet, sand supplies the best ground in which to root cuttings; a deeper setting is necessary in the drier climate of the United States than in England. In a year the cuttings become well rooted, and are then transplanted, after pruning, from the propagating-bed to the nursery row. The nursery culture consists of thorough and frequent stirring of the surface soil, and the training of each plant to tree form. The sprouts and branches are kept removed from about the base to a height of twelve inches (the Germans claim that a height of from three to four feet for the trunk is better); within the next six or eight inches the head is formed of not less than six branches. In the midst of these branches a barrel hoop is often placed, to which the limbs are tied for forming a shapely and open crown. The aim of the two or three years of nursery work is to grow the trees to six or eight feet in height and in form like a goblet, after which they are ready for planting.

"In the Orchard.—The hazel will not thrive in stiff clay, while in dry, sandy soil it becomes stunted and produces fruit of small size. Otherwise, the bush is not particular as regards soil and locality; it is always more vigorous on rich land than on poor land. A light loam

with dry subsoil will give the least wood and most nuts. A strong soil produces an excessive growth of wood at the expense of the crops. Wet soil produces too much wood and too little fruit. In Kent, England, the hazel thrives best in limestone land, and reaches a height of twelve feet, and occasionally of thirty feet. The trees are set in well-drained ground, about ten feet apart each way, though sometimes they are set in hedges, when a less distance in the row is adopted. Root pruning is frequently practised to prevent the too rapid growth of food. The disposition of the hazel to make thrifty inside cane growth is kept constantly in check by summer pruning, and the outer limbs, together with the general growth of the trees, are checked by pruning back in the latter part of the winter. The thin, unfruitful twigs are removed and the fruitful limbs are shortened back nearly to the female buds. Care is taken to leave sufficient male catkins for an ample supply of pollen. The fruit spurs are near the extremities of the last year's growth, and nuts are more abundant where air and light have ready access. In the fifth or sixth year after planting, trees should bear considerable fruit. Trees of this age in England are reported to produce from three to four pounds of nuts each. It is a very important orchard tree with many cultivators in Europe, and has been greatly improved by years of careful cultivation and selection. A very fruitful hazel orchard is reported in Wernfeld, Germany, occupying about two and a half acres of land and having a northwesterly slope. In that latitude the trees are said to thrive with any exposure except directly southern. They are recommended by Goeschke for clothing the steep sides of hills and mountains; also for railroad banks. He states that in Germany they are advantageously used in those portions of fruit orchards where other trees fail.

"Harvesting and Marketing.—It is a popular method in England to harvest and market finer nuts in their husks. In all cases the fruit is left on the bush or tree until fully ripe, the proper condition being readily determined by the brown color of the nut, the tint of the husk, and the readiness with which the nuts would rattle out by a slight jarring of the trees. In curing the nuts thus harvested, they are placed for a few days in lofts to sufficiently dry,

after which they are packed in sound casks with a slight sprinkling of salt throughout the filling. Salt is also used in small quantities in storing the nuts that have been freed from the husks, and it is claimed for this practice that freedom from ravages of insects is secured and that the nuts come out fresher and brighter than by other methods.

"Generally, the hazel is marketed for dessert purposes alone. though a pleasant oil, resembling olive oil, is sometimes ex-



FIG. 553.—Lambert Filbert.

pressed from it; and in portions of Europe this nut, like the chestnut, has been used in limited quantities for making bread."

VARIETIES.

The named varieties are numerous, but the grower having a half-dozen of the best can well afford to forego the planting of others. Of the ten varieties named by Robert Hogg,* the Cob and Lambert are the best known in reputation to Americans. We follow his description of the best varieties known to him:

Bond Nut. Husk hairy, shorter than the nut; nut of medium size, ovate and oblong; shell thin; kernel large. This is an excellent nut and the tree is a good bearer.

* "Fruit Manual," London, 1875.

Cob. (Round Cob.) Husk hairy, shorter than the nut and much frizzled; nut large, obtusely ovate; shell of a light brown color, rather thick; kernel large. A good nut for early use, but does not keep well. Fig. 554.

Cosford. (Miss Young's.) Thin shelled; husk hairy, long as the nut and deeply cut; nut large, oblong; shell of a light-brown

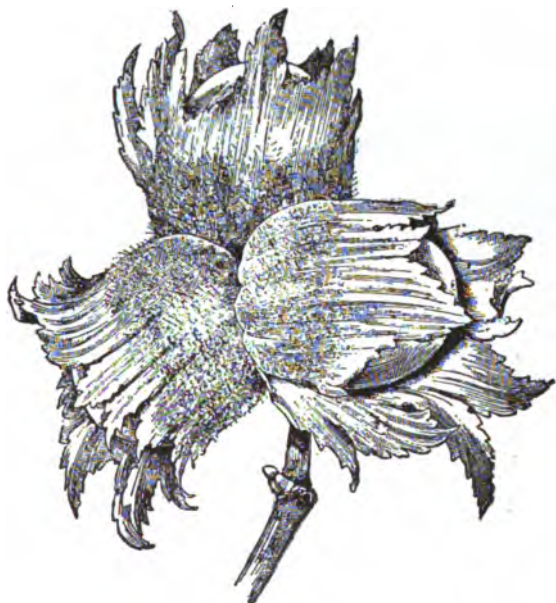


FIG. 554.—Downton Cob-nut.

color, very thin, so much so as to be easily broken between the finger and thumb; kernel large and well flavored. An excellent early nut, and the tree an abundant bearer.

Downton Square. Husk smooth, shorter than the nut; nut large, short, four-sided; shell thick, kernel full and well flavored.

Frizzled Filbert. (Frizzled nut, Cape nut.) Husk hairy, twice as long as the nut; deeply frizzled and spreading open at the mouth; nut small, oblong, and flattened; shell thick, kernel full. This is a rather late variety. The tree is an excellent bearer. The nuts are produced in clusters.

Lambert Filbert. (Kentish Cob, Filbert Cob.) Husk nearly smooth, longer than the nut, and very slightly cut around the margin; nut large, oblong, and somewhat compressed; shell rather thick, of a brown color; kernel full and very rich flavor.

This is, perhaps, the best of all filberts. The tree is a most abundant bearer. Some of the nuts are upward of an inch in length, and they have, with care, been kept for four years. It is only after being kept for some time that their full richness of flavor is obtained. Mr. Hogg says this nut was first brought to the notice of the Horticultural Society by A. B. Lambert about the year 1812. It is improperly called Kentish Cob. The true Cobs are roundish, thick-shelled nuts. Fig. 553.

Pearson Prolific. (Dwarf Prolific, Nottingham Prolific.) Husk hairy, shorter than the nut; nut medium in size, smaller than the Cob, obtusely ovate; shell rather thick; kernel full. A very excellent variety. Trees are most abundant bearers, sometimes laden with fruit when not more than $2\frac{1}{2}$ feet high.

Purple Filbert. (Purple leaved.) This differs from the red filbert in having the leaves of a dark, blood-red color like those of the purple beech. The fruit is similar to, and quite as good as that of the Red Filbert, and is of a deep purple color.

Red Filbert. (Red Hazel.) Husk hairy, longer than the nut; nut of medium size, ovate; shell thick, kernel full, covered with a red skin.

White Filbert. (Wrotham Park.) Husk hairy, longer than the nut, around the apex of which it is contracted; nut medium size, ovate; shell thick; kernel full, covered with a white skin.

HICKORIES.

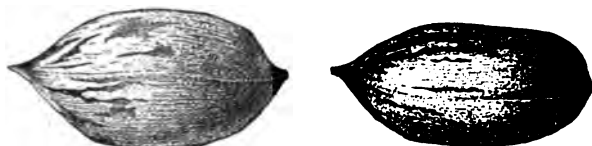
Pecans (Hicoria Pecan).

It is commonly supposed that the pecan is hardy only in the Southern States, and few attempts have been made to grow it in the North. It flourishes best in Texas, the Gulf States, and Mexico. Probably the greatest quantity sent to market comes from Texas or Louisiana, where the tree grows to sixty or seventy feet high in the rich alluvial bottom-lands and annually produces large crops of nuts, which find a ready market at very remunerative prices. The thinness of the shell, its bright glossy surface, often artificially polished for market, but above all the full, tender, rich kernel, combine to make this member of the hickory family the popular nut-tree after the chestnut grown in America. West of the Alleghanies the pecan has been found growing wild and yielding good nuts as far north as Southern Iowa. Forty miles north of New York there are some very large old trees, which are evidently hardy enough, but they have never been known to produce nuts.

The tree as grown in the South much resembles the common hickory, grows to about thirty feet high in fifteen years, and bears at ten or twelve years of age.

Pecans are usually propagated from seed, but the results are so unreliable that grafting or budding must take place as the only certain way of obtaining valuable sorts.

The remarks made in the introduction to this chapter concerning the difficulties of transplanting nut-trees apply with



FIGS. 555 and 556.—Common Forms of Pecan.

intensified force to the pecan, whose tap-root is, in one and two year seedlings, three times as long as the shoot above ground. They must be treated as suggested for other nut-seedlings—the ground must be rich and deeply cultivated.

If raised from seed, plant the nuts in drills three or four feet apart, and twelve or fifteen inches apart in the drills.

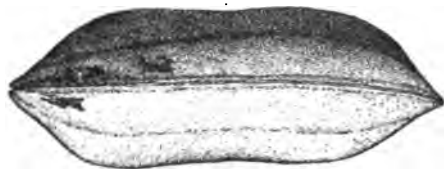


FIG. 557.—Centennial.

In the early spring following, the young trees should be about two feet high; take them up carefully, to preserve all the fibrous roots possible, cut off about one-half the tap-root, and reset immediately. Two years after, again take up and plant permanently, or, preferably, make the permanent planting at the end of the second year. Six or seven years subsequently, the trees should begin to bear, and as it is a rapid grower it is said that at fifteen years of age it will produce from two and a half to three bushels of nuts. Grafted or budded trees al-

ways produce fruit earlier. For directions concerning grafting, see general directions elsewhere in this book.

There has been too little attention given to the commercial growing of pecan trees to enable one to procure any definite sorts from nurserymen. The varieties here enumerated have generally been named by their discoverers or propagators,

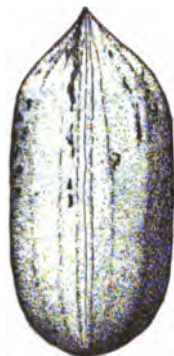


FIG. 558.—Frotscher.



FIG. 559.—Idlewild.

and are mostly taken from their reports to the United States Pomologist. Correspondence with these parties is suggested to those who wish to obtain the choicest kinds thus far known.

VARIETIES OF PECANS.

Biloxi. (Mrs. W. R. Stuart, Ocean Springs, Miss.) Medium size, cylindrical, pointed at each end; surface quite regular, light brown; shell thin; cracking qualities medium; kernel plump, with yellow-



FIG. 560.—Jewett.

ish-brown surface; free from astringency, of good quality, and keeps well without becoming rancid. Introduced several years ago by the late W. R. Stuart as Mexican Paper-Shell, but the name has since been changed to Biloxi.

Centennial. A large oblong nut; thickness of shell medium; partition walls rather thick; kernel plump, oily, good. Richard Frottscher, New Orleans, La. Fig. 557.

Columbian. (Mrs. W. R. Stuart, Ocean Springs, Miss.) Large, cylindrical, somewhat compressed at the middle, rounding at the base; pointed and somewhat four-sided at the crown; shell rather

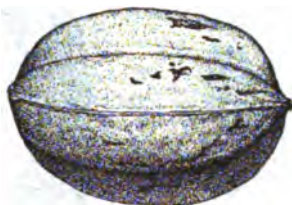


FIG. 561.—Jumbo.

heavy; cracking qualities medium; quality good. In size and form this nut closely resembles Mammoth, which was introduced in 1890 by Richard Frottscher, of New Orleans, La.

Faust. A long slender nut, good. D. D. Faust, Bamburg, S. C.

Frottscher. Large; very thin shell; kernel oily, good. Richard Frottscher, New Orleans, La. Fig. 558.

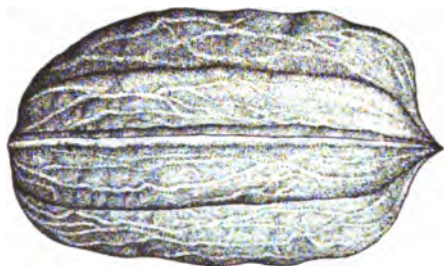


FIG. 562.—McCallister.

Gonzales. (I. V. Munson, Denison, Tex.) Above medium size, with firm, clean shell; quality excellent. Originated in Gonzales County, Tex.

Idlewild. Medium size, thick shell, kernel good. Louis Biediger, Idlewild, Tex. Fig. 559.

Jewett. Large, irregular oblong, compressed near centre; shell rather thick; corky inner growth large; kernel oily, good. The late W. R. Stuart, Ocean Springs, Miss. Fig. 560.

Jumbo. Large, ovoid; thin shell, much corky partition; quality very good. F. M. Ramsay, Bluffton, Tex. Fig. 561.

McCallister. (Floyd.) The largest pecan known, supposed to be a hybrid of shellbark; base broad, rounded; apex broad, blunt, angular; flavor very like a shellbark; not very valuable except for possibilities of improvement. O. L. McCallister, Mt. Vernon, Ind. Fig. 562.



FIG. 563.—Risien.



FIG. 564.—Stuart.

Pearl. Medium size, thin shell, sweet kernel; no corky growth inside. A choice nut for family use, but said to be too small for market. E. E. Risien, San Saba, Tex.

Ribera. Size above medium; oblong ovate; cracking qualities good; shell thin; kernel plump, light brown, free from the bitter, red, corky growth which adheres to the shell; meat yellow, tender, with rich, delicate, pleasant flavor.

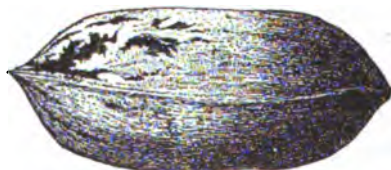


FIG. 565.—Van Deman.

Risien. Large ovate; quality excellent. E. E. Risien, San Saba, Tex. Fig. 563.

San Saba. Medium, cylindrical; kernel plump, light yellow, sweet and rich. E. E. Risien, San Saba, Tex.

Stuart. Large, roundish, ovoid; thin shell; considerable corky growth in partitions; kernel plump; quality good. Late W. R. Stuart. Fig. 564.

Van Deman. Large, oblong; thin shell; considerable corky growth; kernel not so plump as Stuart; flavor excellent. Mrs. W. R. Stuart. Fig. 565.

Shellbark Hickories.

Of the several varieties of ordinarily so-called hickories found growing wild in the United States—as the shellbark (*Hicoria laciniosa*), shagbark (*Hicoria ovata*), mocker-nut (*Hicoria alba*), pignut (*Hicoria glabra*) bitter-nut (*Hicoria minima*) water hickory (*Hicoria aquatica*), and nutmeg-hickory (*Hicoria myristicæ formis*)—the first only has qualities which commend themselves for cultivation. As this work is intended



FIG. 566.—Typical Thin-shell Shellbark.



FIG. 567.—Oval.

to be strictly practical, only the shellbark hickory will therefore be treated of.

Perhaps but one variety of this nut has been subjected to cultivation and offered for sale (Hale's Paper-Shell). All others are the product of wild trees. And yet the differences in the sizes of the nuts, the thickness of the shell, the qualities of the kernels, the cracking peculiarities, and the freeness with which the meats may be extracted are very marked.

While size undoubtedly has a large influence in the selling of nuts, it is well known to all who have had any intelligent experience that comparatively small nuts have frequently disproportionately large and extremely high-flavored kernels.

The slow growth of the shellbark has and will have a deterrent effect upon its cultivation, and while a wild two-year-old will often be found four to five feet high, a trans-

planted tree three or four years old seems to make almost no growth for a year or two.

The late A. S. Fuller says he never knew an instance of successful budding of the hickory, while others claim that ring budding (see page 45) is moderately so.

Of the methods of grafting, the cleft (see pages 33 and 376) is said to give the best results, cutting the young trees close to the ground, inserting the scion, waxing thoroughly, and covering to its top with earth.

The nuts germinate easily, but, however valuable those planted, seedlings are nearly always inferior in every way to



FIG. 568.—Quadrangular.



FIG. 569.—Long Ovate, Compressed.

the originals. For stocks, nevertheless, upon which to graft scions from wild trees which are found to produce nuts of exceptional merit, they are well worth planting. If taken up from the nursery rows annually and the tap-root shortened in for two or three years, then planted out where the tree is to remain permanently, growing for one year and then cleft-grafted, every requisite for success at present known will have been complied with. If wild trees are dug for the purpose of grafting, those not over two or three years old should be taken, the chances of living of older and larger ones being too uncertain to make such experiments worth the trouble and cost.

The reports of the United States Pomologist give a list of a dozen or so of varieties which have been named by those who have found or own the wild trees upon which they grew. But it is so uncertain that any of these can be had by the

intending purchaser, that no list of varieties would be of much value at this time.

Illustrations are given of various shellbarks collected by the editor, or sent to the Department of Agriculture from different parts of the country, to show the variety in shape and appear-

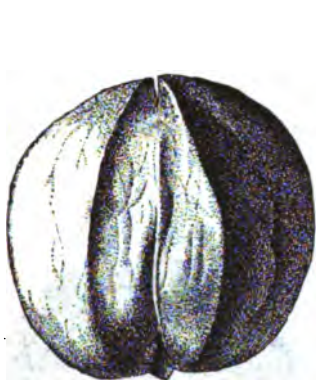


FIG. 570.—Roundish, Compressed.



FIG. 571.—Roundish, Oblique.

ance of wild nuts. Probably the number might be largely increased. Fig. 566 represents the typical form of the thin-shelled shellbark; any very wide departure from this shape, as Figs. 567 to 571 inclusive, usually indicates thicker shells and correspondingly smaller kernels.

WALNUTS.

The name walnut is rather indiscriminately used in this country, being perhaps most frequently applied to hickory-nuts (white walnuts, so called), and after them to the Persian or Madeira nut. Two valuable members of this family are indigenous to America, whose nuts are highly appreciated and much used, the butternut (*Juglans cineria*) and the black walnut (*Juglans nigra*). The value of the timber of both these trees is well known, and alone should offer sufficient inducement for their cultivation. So great, indeed, has been the demand for the latter that there has seemed danger it would become exterminated wherever within profitable reach of a shipping-point, and the use of the former is rapidly increas-

ing, with a probability of the same reckless cutting that has befallen the black walnut. While possibly it may not pay in a pecuniary way to propagate either of these trees for their nuts alone, together with the value of the timber, constantly increasing in price, it offers an opportunity to those having land adapted to their growth.

The Butternut

is considered by many the best of all native nuts. The meat is tender, crisp, oily, and highly flavored. The thick-



FIG. 572.—Typical Butternut.



FIG. 573.—Typical Black Walnut.

ness and sharply ridged and furrowed character of the hard shell is a drawback to its use; nevertheless, the richness of the kernel makes them well worth adding to the varieties of nuts for home use.

There are no named varieties in the hands of nurserymen, who supply orders with seedlings usually from trees in their neighborhood or from nuts purchased by them. As usually the case, however, there are considerable differences in size and shape of nuts found growing wild in different sections of the country. Fig. 572 is a typical illustration.

Those who wish to grow either the butternut or the walnut will do best to select the nuts which please them and raise their own seedlings.

The Black Walnut.

is a large, round, hard-shell, deeply furrowed nut, with a rich, oily kernel. While much appreciated by most, its flavor is so pronounced as to make it unpleasant to others. Large quantities are used by confectioners and others, and its sale is of considerable value to those who are fortunate enough to own a number of trees.

It is found growing all over the United States, making a



FIG. 574.—Black Walnut (Taylor).



FIG. 575.—Peanut-shaped Black Walnut.

tree from forty to sixty feet high. It has a more open spreading head than the hickory, and is more rapid in its growth. The nuts from different trees and sections vary considerably in size and depth of the furrows. The photo-engraving is an average specimen, while the other illustrations of this nut show variations.

PERSIAN WALNUT.

(*English Walnut, Madeira Nut.*)

The varieties of this nut, together with the hickories, belong to the order *Juglandæ*, and, while the genus under consideration is a native of Persia, the greater number of species are indigenous to North America. In England this nut is known

simply as the walnut, while in the United States it is commonly called English walnut or Madeira-nut. The varieties which have been introduced, chiefly from France, are quite numerous. They have all been the product of selected seedlings or careful hybridizing. Recently Eastern Asia and Japan have added to the number, and the illustrations here given show that the grower has quite a scope for his taste and fancy.

The trees will endure a considerable degree of cold, but from experience over the greater part of the United States it has been noted that it does not succeed in the Middle States, nor westward to the Rocky Mountains. They are hardy near the coast line as far north as latitude 40°, and do well southward as far as Northern Georgia. It is sometimes the case that the trees flourish but produce no fruit, or the nuts contain no kernels. The consensus of opinion among those who have propagated this nut appears to be that it really succeeds as a crop-producer in comparatively few places in the United States east of California.

In England and on the Continent the trees are said to be practically free from diseases. In the United States a minute worm (*Anguillula*), which infests the soil, particularly of the Gulf States, gets into the young roots and causes the root-knit which is such a destructive pest in these States.

Propagation.—All of the walnuts may be readily raised from seed. The nuts should be kept through the winter, and planted in the early spring as directed on page 378. In good soil and under favorable conditions they will sprout and grow two to three feet high the first season. The care of the seedlings is the same as stated in the general directions at the beginning of this chapter. As a rule, no pruning is required by these trees; they usually begin to bear at ten to fifteen years. The Japanese varieties are said to produce nuts at a much earlier age, say five to six years, and grafted trees at three to five years.

VARIETIES.

So few of the different named varieties of walnuts can be had from nurserymen that the following brief descriptions and illustrations are given, chiefly as matters of interest in this con-

nection. Where it is believed that any variety can be purchased, an asterisk follows the name.

The smallest cultivated nut is *Juglans regia microcarpa* (Fig. 576). The shell is thick, the kernel correspondingly small. The largest walnut is *Juglans regia gibbosa* (Fig. 577). The shell is thick, hard, and roughly corrugated, and the kernel quite small for so large a nut; the flavor is said to be good. *Juglans intermedia pyriformis* is claimed to be a hybrid of the Persian walnut and the black walnut. The fruit, as the name indicates, is pear-shaped. The nut has the hard, thick shell of the black



FIG. 576.—*Juglans Regia Microcarpa*.



FIG. 577.—*Juglans Regia Gibbosa*.



FIG. 578.—*Juglans Regia Barthièveana*.

walnut and its consequent limitation of space for the kernel, but it is said to split readily and the meat to leave the shell freely. A peculiar form of the walnut is shown in Fig. 578, *Juglans regia Barthièveana*, which its originator, M. Barthiève, of Toulon, France, says is of exceptional merit—thin shell, splitting easily; kernels full, rich; very prolific and bearing early from seed. The following are varieties of the Persian walnut:

Chalbert.* Medium, oval, oily, good, productive; blooms late. Fig. 582.

Franquette.* Large, oval, rich, excellent table sort. Fig. 586.

Kaghagi.* Large, handsome nut; meat fills the shell; high flavor; claimed to be the hardiest of the Persian walnuts.



FIG. 579.—*Juglans Cordiformis*.

Mayette.* Large, oblong, oily, good; nuts grow in pairs; shell hard; blooms late. Fig. 587.

Parisienne. Large, oblong, excellent; good table-nut. Fig. 583.

Preparturiens. A dwarf variety of *Juglans regia*. Fig. 584.

St. Jean. Medium, roundish; hard shell; meat oily. Cultivated chiefly for its oil. Fig. 585.

Asian and Japanese.

Cordiformis. Small, heart-shaped; thick, hard shell. Fig. 579.

Japan.* (*Juglans Sieboldiana*.) Small, hard shell; sweet, rich kernel; grow in bunches of fifteen or twenty in an odd-looking husk. Tree hardy and vigorous grower; round head; ornamental. Fig. 580.



FIG. 580.—*Juglans Sieboldiana*.

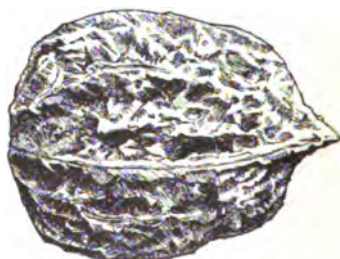


FIG. 581.—*Juglans Manchuria*.

Juglans Manchuria.* A large thick, rough-shelled nut from Eastern Asia. The tree is vigorous, entirely hardy, and fairly productive. Much resembles the butternut in appearance. Fig. 581.



FIG. 582.—Noix Chabert.

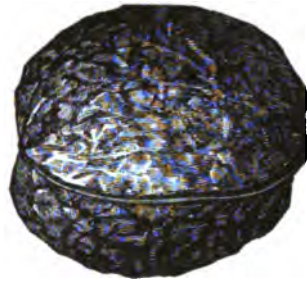


FIG. 583.—Parisienne Walnut.



FIG. 584.—Preparturiens.



FIG. 585.—Noix St. Jean.



FIG. 586.—Noix Franquette.

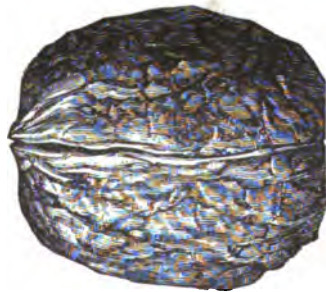


FIG. 587.—Mayette Walnut.

CHAPTER XXVIII.

THE PEACH.

THE PEACH, when in perfection the most delicious fruit of our climate, succeeds in favorable localities, from Maine to the Gulf of Mexico. In the more northern regions, the ripening of the earlier varieties commences only a few weeks before the close of the summer months; in the extreme South, well-matured peaches are obtained nearly as early as cherries and strawberries at the North.

The trees are more tender and of shorter duration than most fruit trees of temperate climates. In some localities they bear only two or three good crops, and then decline or perish. On favorable soils they continue for twenty or thirty years. In Western New York trees have in rare instances borne fruit for forty or fifty years. In France, according to authentic testimony, peach-trees which have been annually and freely pruned have lived to an age of one hundred years; and there is no doubt that on favorable soils, and by a regular shortening-in pruning, most of our orchards would endure much longer than the ordinary period.

The most extensive peach-growing regions are in New Jersey, Delaware, Maryland, and portions of the West—some orchards containing forty or fifty thousand trees, and hundreds of acres occupied with the plantations of single proprietors. The northern portions of Ohio and Western New York, protected on the north by Lakes Erie and Ontario, and Western Michigan, afford a very favorable climate for this fruit. But throughout the country at large, the selection of proper localities would doubtless afford good and regular crops, even in districts where its culture is rarely attempted. The remarks on this subject in a previous chapter of this work are particularly commended to the attention of those who may attempt the peach culture in severe climates.

The destruction of the peach-crop is caused in nearly all cases by the intense cold of winter. Vernal frosts, to which its loss is often erroneously ascribed, rarely have any influence. If the fruit-buds remain unswollen, they will endure very severe cold. But it often happens that we have a few days of mild or warm weather during winter. This is sufficient to swell them slightly, or to throw moisture enough into them to render them tender; and if the thermometer should



FIG. 588. FIG. 589. FIG. 590.
Peach Buds (Magnified Twice).

then sink several degrees below zero, there is scarcely a chance for their escape. Their condition may be soon ascertained by making a cross-cut with a knife through the fruit-buds. If destroyed, the centre will be dark brown; if uninjured, they will present the fresh yellow centre of sound buds. The accompanying figures represent the branches and buds of the peach magnified twice in diameter. Fig. 589 shows the two flower-buds, with the usual leaf-bud between, before they have become swollen by warm weather. Fig. 588 represents the appearance of the same after the occurrence of several warm days after midwinter. Fig. 590 exhibits the dark and dead interior of a flower-bud cut through its centre, after it has been killed by the frost. Under ordinary circumstances, the peach crop is destroyed when the thermometer sinks about 12° below zero (Fahr.); but when the buds have been much swollen, the crop has sometimes been cut off when only 5° or 6° below; while in rare instances unswollen buds under

favorable circumstances have passed uninjured through a temperature 20° below zero.

PROPAGATION OF THE TREES.

The peach-tree is of remarkably easy and rapid propagation. In rare instances, seedling trees have borne the second year, or sixteen months from the planting of the stone. Stocks may be budded the first summer, affording trees five or six feet high the second autumn. Transplanted the second year from the bud, the trees, with good cultivation, usually come into bearing about the third year afterward.

Some varieties reproduce the same from the stone with slight variation, but the only certain way to perpetuate delicious sorts is by budding. Grafting at the North rarely succeeds; at the South it is often successful. It often happens at the North that the severe frost of winter destroys the inserted buds, which die and drop off, leaving the attached portion of bark adhering fresh and green to the stock. This disaster, which so often disappoints the hopes of the young cultivator, is to be prevented by selecting buds from the largest and thriftiest shoots. These usually possess sufficient vigor to withstand severe frosts. The triple buds on the older and more matured portions of the shoots of bearing trees generally survive when the single buds above them perish, as may be at once perceived by examining the shoots of bearing trees late in spring.

When stocks are not budded till the second summer, it is very important to cut them down the previous spring, and suffer but one ascending sprout to grow, which will form a fine thrifty shoot for the reception of the bud.

In raising stocks, select the seed of hardy and late varieties. The stones are not injured if kept dry in a cellar till winter. If they become water-soaked for a length of time, they are spoiled. But soaking in water for a day or two and subsequent exposure to freezing facilitate the cracking of the stone. They may be kept through winter mixed with moist sand, and exposed to freezing and thawing, or placed in a moist cellar till near spring, then soaked in tubs or barrels, till the shells are well swollen with moisture. They are then placed in thin

layers on the surface of the ground, and exposed for two or three weeks to the action of the frost, being protected from drying by a covering of soil, leaf-mould, or muck. About the time the frost disappears from the ground, they are taken up and cracked by hand, placing the stone on the end of a wooden block, and striking a gentle blow on the side edge with a hammer. The kernels are thus taken out uninjured. They are then planted one or two inches deep (a light thin soil needing more depth than a heavy and moist one), and if they have been previously uninjured nearly every one will grow. Care is needed that the seeds do not become dried nor mouldy before planting.

When it is intended for them to come up evenly, as they are to remain in the nursery row, the most certain way to avoid vacancies or failures is to sprout them before planting. This is effected by mixing the kernels with sand and leaf-mould, and spreading them in a thin bed in the sun. When sprouted, a line or cord, permanently marked at equal distances of eight inches with a touch of paint, is stretched on the ground, and a sprouted kernel carefully inserted at every mark of the line, by means of a transplanting trowel. This insures great regularity in the rows. Accidental vacancies may be filled from a seed-bed when the plants are not more than two inches high. To prevent drying, the sprouted seeds should be kept covered with a flake of wet moss or a wet cloth, until deposited in the ground; and if the weather be dry, watering the ground may be requisite.

By planting the stones without cracking, a very small portion will grow and no regularity can be attained in the rows, unless the following mode is adopted, which, if the stones can be had fresh from the fruit before drying many days, and in large quantities, is perhaps the cheapest or attended with least labor. Mix the fresh stones with moist sand, spread them in a stratum about six inches thick over the ground, and cover them with a few inches of old straw or coarse manure to prevent drying. Remove this covering in winter, to expose them freely to freezing and thawing. In spring, a large portion will be found sprouting; carefully select these and plant them immediately in drills made with the hoe, covering them by drawing on earth with the hand. One man will thus

plant four or five thousand in a day. In a few days a second portion will be found sprouted, which plant as before; and so on, so long as the process continues. Those which do not open (often not more than one-third of the whole), will grow another year if kept moist and exposed.

If the soil is good, and the cultivator is passed between the rows as often as once a fortnight—oftener is better—the trees will be large enough to bud by the close of summer.

In cases where the ground cannot be prepared early for their reception, germination may be retarded by burying the uncracked stones a foot or two beneath the surface, till wanted.

The distances of the rows asunder should be about the same as for apples and other trees in the nursery, or about three and a half feet.

Plum-stocks for the peach slightly lessen their luxuriance of growth, render the trees smaller, thus slightly increasing their hardiness for the extreme North by favoring an early maturity of the young wood. It is, however, important to observe that this does not add to the hardiness of the fruit-buds. Small dwarfs are produced by budding on the *Mirabelle*, a diminutive variety of the plum. The plum-stock is also sometimes employed to guard against the peach-borer, a remedy often unsuccessful, as that insect frequently attacks the peach above the place of union. On the whole, the practice of working the peach on the plum is not regarded by fruit-culturists with much favor.

Unlike most other fruit trees, the peach may be transplanted in the spring next after the insertion of the bud, with scarcely a check in its growth.

Soils.—It may be observed, as a general rule, that soils affording good farm crops, and with a well-drained subsoil, are well adapted to peach-orchards. On a strong loam, the trees grow with more uniform luxuriance and live longer than on light, sandy, or gravelly soils. Even a compact clay may be made suitable for the peach by regular and thorough underdraining and mellow cultivation. On the light sands of New Jersey and Delaware orchards succeed and bear well for a time, but they do not endure so long as where the soil has a considerable admixture of heavier ingredients.

In transplanting for an orchard, the practice of *shortening-in* the shoots, described in the chapter on transplanting, should be invariably attended to, as it is of the greatest importance for the safe removal of peach-trees. Trees two years from the bud, where this practice is observed, will be found better for Northern latitudes than those of one year only. Twenty feet apart is the common distance for orchards; but as better crops and better fruit is obtained where the heads are kept well shortened-in, and consequently within less compass, a distance of twelve or fifteen feet only will be found sufficient.

While the trees are small, the intermediate spaces between the rows may be cultivated with low-hoed crops; but afterward it will be found best to keep the ground perfectly clean and mellow by ploughing and harrowing. Where soils are very shallow, top-dressing with manure in autumn and frequent harrowing have been found best; the roots being thus brought near the surface, deep ploughing proves injurious. But where soils are deep and fertile, ploughing may be occasionally resorted to without injury.

The principle on which rotation in crops is founded dictates that two crops of peach trees, whether in the nursery or orchard, should not be grown successively on the same piece of ground; diminished growth in all such instances being the result.

One of the best manures for the peach-tree is wood ashes, whether fresh or leached; hence all composts with this material are eminently beneficial to peach orchards. When applied alone, half a peck of fresh and half a bushel of leached ashes to each tree are suitable quantities, spread broadcast over the surface.

The mode of *pruning* and *shortening-in* the peach has been already described in a previous chapter.

Training the peach against walls and buildings, so essential to the successful culture of the peach in England, is rarely practised in this country. It would doubtless hasten the maturity of the crop; but the warm exposure would at the same time, unless the branches were purposely protected, render the crop more liable to destruction by frost. *Espalier training* has been found to give excellent fruit, in consequence of the



thorough pruning and full exposure adopted in the management of the trees. Figs. 591, 592, and 593 exhibit the fan training usually adopted in espalier and wall training, in its successive stages. The limits of this work do not admit full directions, but the following general rules may be observed as a guide and will apply to all other annual pruning of the peach: 1. The fruit being borne on the shoots of the preceding year, a good supply of annual bearing-shoots must be kept on all parts of the tree. 2. As the shoots, left unpruned, extend yearly in length, and become bare on the sides, it is necessary to cut them back, in order to keep up a supply of new shoots from their base. 3. Rub off or cut out all the

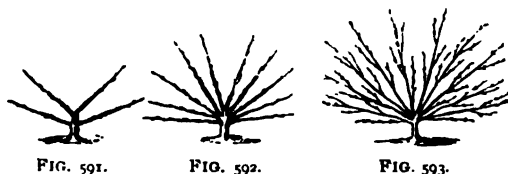


FIG. 591.

FIG. 592.

FIG. 593.

Fan Training of Peach-Trees.

shoots which spring up from the bases of shoots thus cut back, leaving only a few strong ones at regular distances, so as to admit sun and air to the leaves, which distance may be usually about six inches.

RAISING PEACHES IN POTS.

Peaches are raised in pots to secure uniform crops every year in an uncertain climate, to test new sorts, to produce early bearing, and to obtain a supply of peaches where the grounds are too small for planting an orchard. Two modes are adopted—one without fire heat, the crop maturing a little earlier than in common orchards; the other, where, by the use of fire heat, the fruit is obtained two or three months earlier than in open ground.

Among those who have most successfully adopted the first-named mode are Ellwanger & Barry, of Rochester. P. Barry has furnished the following statement of their management, written when the trees were three years of age and in successful bearing:

"We have now fruiting, in wooden boxes ten by ten inches, fifty-three varieties of peaches, eleven varieties of nectarines, and seven of apricots.

"Age, Potting, and Soil.—The trees are now three years from the bud. They were taken up in the fall of 1861; heeled-in and covered during winter; potted early in spring—March, I think; soil a mixture of about three parts yellow sandy loam and one part of old hotbed manure.

"Summer Care.—After potting they were kept in a cool house, partly covered with glass, until they had made shoots four or five inches long and the danger of cold weather was over. They were then plunged to the rim of the boxes in an open border until the fall. They were carefully watered when necessary during summer, and the shoots kept as much as possible in uniform vigor by pinching.

"Pruning.—When potted, the yearling trees were cut back to six or eight inches, and in some cases to four inches, or only two or three buds above the union of bud and stock, the object being to grow them in the form of bushes. We now find that those cut back farthest are the best trees. [Fig. 594 represents the yearling tree; Fig. 595, the same cut back; Fig. 596, the tree set in a pot; and Fig. 597, the same after a year's growth.]

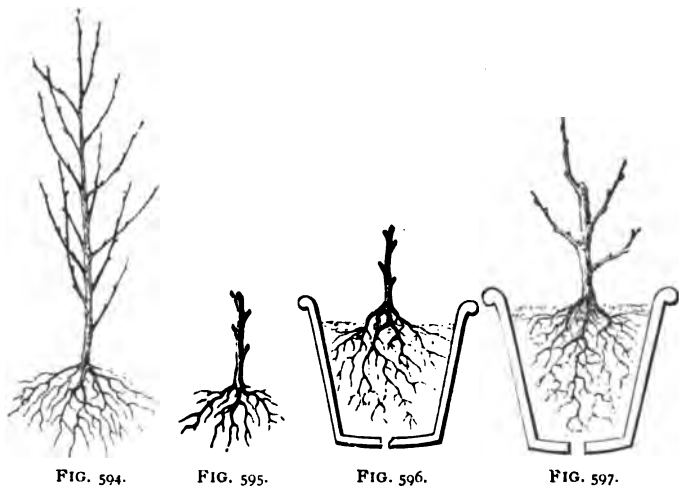
"Wintering.—On the approach of very cold weather, or just before the freezing of the ground so as to prevent outdoor work, they were removed to a shed, where they were plunged as they had been during summer, up to the edges of the tubs.

"Spring Treatment.—On the return of mild spring weather abundance of air was admitted, and they remained there till 1st of May, when they were placed under glass, the buds at this time being about to expand. Here they were kept till the 15th of June, at which time the fruits were set, and all danger of cold to affect the foliage past.

"Ventilation and Watering.—During the period they were under glass, May 1st to June 15th, the principal points of management were ventilation, which was ample, and watering—the latter being one of the most important points in the treatment of all trees and plants in pots. Careless watering will ruin any plants, no matter how skilfully or carefully

other points may be managed. Daily watering is necessary, and as soon as out of bloom a free use of the syringe night and morning.

"*Summer Treatment.*—On the 15th of June, when all danger of cold was over and the fruits set, they were removed from the glass covering and plunged in an open but sheltered border, and mulched with old hotbed manure. Since that



Raising Peaches in Pots.

time they have received no care but watering, except an occasional pinch, to regulate the growth of shoots.

"There has not been a single leaf curled on any one of all these trees, showing conclusively that the curl is due to unfavorable changes of weather. Each tree now is a bush about two and a half feet high, and occupies about three feet square of space.

"The first winter we had potted trees we kept them in a cellar, but most of the buds dropped, and we changed to the cool dry shed, the boxes plunged, and this has been successful.

"The uncertainty of our climate now, as to the peach crop, compelled us to adopt this mode of testing varieties, and we are much pleased with the results thus far. As to the amount

of labor required, it would not be possible to state it with any degree of precision, as it is made up of odds and ends."

WINTER PROTECTION FOR THE TREES.

In the chapter on the Situation of Orchards, directions were given for the selection of sites for peach-orchards, to secure them against the destruction of the crop by the cold of winter. There are large districts throughout the more northern States where a selection of this kind cannot be made, and where the frequent and general failure of the crop indicates the necessity of some artificial protection. Various experiments for this purpose have been made, among which the following have so far proved most successful.

1. Training the young trees very low or near the ground, so that the branches may be bent down in winter, and covered with straw, corn-stalks, or, still better, with forest leaves or evergreen boughs. It is important that the branches should be laid upon the earth, that they may receive warmth from below, and the covering should be thick enough to exclude the cold air. Attempts to protect the fruit-buds by encasing them in non-conducting substances, without bending down, have generally proved failures. Covering with earth has been tried, but the moisture often rots the buds.

2. As the limbs of the peach soon become quite rigid, while the roots are more flexible, a more successful mode has been adopted: When the young trees are set out, the principal roots are extended in opposite directions and the others are kept cut off. This enables the tree, when the earth is partially dug away, to turn as on an axle by a slight twisting of the roots, so that it may be easily laid upon the ground. If trained flat or fan-shaped, it is easily covered.

3. A third mode has been successfully adopted in some of the western States. The trees are planted in a row and the branches trained horizontally in opposite directions. Posts are set between the trees four or five feet high, and the tops connected by strong horizontal poles. On the approach of winter, rafters are placed on each side against these poles, so as to form a rather steep roof. The outer limbs may be bent under the rafters if necessary. The whole is then cov-

with dull purple next the sun; flesh greenish, slightly red at the stone, very juicy, melting, rich, with an excellent sub-acid, vinous flavor. Ripens end of summer. A moderate bearer. Shoots slightly liable to mildew. A spurious sort with globose glands, and of inferior quality, has been generally disseminated in this country. Flowers large.

Noblesse. (Vanguard, Mellish's Favorite.) Large, round-oblong or oval, slightly narrower at apex, and terminated by a short acute point; skin pale green, clouded and shaded with light dull red to the sun; flesh pale greenish-white to stone, very juicy, with a very rich high flavor. Tree of rather slow growth and liable to mildew, the only drawback on the value of this excellent peach. Ripens end of summer and the beginning of autumn. English. Flowers large.

Red Rareripe.* (Early Red Rareripe, Large Red.) Rather large, globular, broad, and depressed, suture broad and deep, passing nearly round the fruit; skin nearly white, with red dots in the shade, and a rich dark-red cheek in the sun; flesh whitish red at the stone, juicy, rich, and high flavored. Ripens during the last two weeks of summer. Flowers small. Resembles the Royal George, but superior in quality. Both are subject to mildew of the leaves.

Royal Charlotte. Rather large, approaching ovate, base slightly wider than apex, suture moderate; skin pale greenish-white, with a deep-red marbled cheek; flesh white, pale red at the stone, juicy, rich, fine. Flowers small. First of autumn.

Royal George. (Early Royal George.) Rather large, globular, broad and depressed, or inclining to oblate; suture deep at apex, passing two-thirds round the fruit; skin nearly white, thickly dotted with red, with a broad, deep, rich red, slightly marbled cheek, flesh whitish, very red at the stone, juicy, and rich. Ripens a week or two before the end of summer. Flowers small. A moderate bearer. Shoots liable to mildew.

Serrate Early York.* (True Early York, Early York of Downing, Early Purple *erroneously*.) Size medium, roundish oval, suture slight; dotted with red on greenish-white in the shade, dark red to the sun; flesh very tender and full of juice, rich, with a faint mingling of acid. Quite early, or middle of August. Growth rather free for a serrate-leaved peach. Very productive, and from its earliness of great value. Differs from the Large Early York by its large flowers, cut leaves, oval fruit, and earlier maturity. Flowers large.

Walburton Admirable. Large, roundish, greenish-white, dark-red in sun; flesh white, red at stone, juicy, sweet. Middle and last of September. English.

Section II. Leaves crenate, with globose glands.

Alexander.* Medium, white, covered deep red; flesh white firm, juicy, sweet; pit nearly free; flowers large. An extra early vari-

ety. Good market peach. Very difficult to distinguish from Amsden; has many synonyms.

Amsden.* Size medium, roundish; shaded and mottled red; flesh melting, juicy, very good in quality, adhering to the stone. Tree vigorous, glands globose, flowers large. One of the earliest peaches, ripe at the North the latter part of July, and the last of May in the Gulf States. The Alexander closely resembles the Amsden in every particular. There are several other new sorts ripening about the same time, and similar in character and quality.

Astor. Large, slightly oblate, apex slightly depressed, suture distinct; surface nearly white, with a deep red cheek, stone small; flesh very juicy, sweet, good. Flowers large. Ripens end of summer. Origin, New York.

Barrington. Large, roundish ovate, apex rather pointed, suture on one side, moderate; skin nearly white, with a deep red, marbled cheek; flesh slightly red at the stone, juicy, rich, and of high quality. Flowers large. Ripens early in autumn. Does not attain its full flavor north of New York City. English.

Bellegarde.* (Galande, Smooth-leaved Royal George, *Violette Hative of some, Red Magdalen erroneously.*) Size medium or large, round, regular; suture shallow, deepest at apex, with a slight projecting point; skin nearly white, with a faint tinge of green, and a rich red cheek, often streaked darker; flesh slightly red at the stone, a little firm, melting, juicy, rich, and of fine flavor. Stone rather large. End of summer. French. Flowers small.

Carpenter's White. Very large, round; white, slightly greenish; flesh white to the stone, juicy, melting, rich, excellent. Middle of October, promises well for market. Vigorous and productive. New York City.

Cole's Early Red.* Size medium, roundish; suture small; skin mostly mottled with red, with dark red on the sunny side; flesh juicy, rich, with a pleasant and fine flavor, hardly first-rate in quality. Flowers small. Valuable for its great productiveness and early maturity, ripening nearly as early as the Serrate Early York. American.

Coolidge's Favorite.* Rather large or medium, roundish, largest on one side; suture distinct at apex; skin nearly clear white, mottled with red dots in the shade, and with a brilliant deep scarlet cheek in the sun; flesh very melting and juicy, with a rich, faintly acid flavor. Ripens about the middle of August. Flowers small. Origin, Watertown, Mass.

Druid Hill. Very large, roundish, cavity rather narrow, suture slight, with a distinct but scarcely prominent point at apex; surface pale greenish-white, clouded with red toward the sun; flesh greenish-white, purple at the stone, juicy, with a rich, very good flavor; stone long and rather compressed, much furrowed. Flowers small. Ripens quite late, or latter part of September. Origin, Baltimore.

Early Admirable. (Admirable, Belle de Vitry *erroneously.*) Size

medium, nearly round, skin nearly white, with a red cheek; flesh red at the stone, juicy, rich, sweet, fine. Quite early, ripening immediately after Serrate Early York. Flowers large. French.

Favorite. Large, oblong, or oval; skin rather downy, much covered with red, very dark toward the sun; flesh red at the stone, a little firm, juicy, with a good, vinous, but not rich flavor. Flowers small. Hardy and very productive. Ripens medium or rather late, or about the second week of September. Glands of the leaves very small, obscure, or none. American.

Fay's Early Ann. A seedling from the old Early Ann, glandular, thrifty, hardy, very productive; fruit greenish-white, rather small, of good and agreeable flavor. Ripens with the Tillotson, and valuable for its earliness.

Fox's Seedling. Round, slightly compressed, cavity narrow; white, with a red cheek; juicy, sweet, good. Flowers small. Season medium or rather late. New Jersey.

George the Fourth.* Large, round, suture deep and broad, one-half slightly larger; skin nearly white in the shade, dotted red with a deep red cheek; flesh slightly red at the stone, melting, juicy, rich, excellent. Flowers small. Ripens at the end of summer. Branches rather more diverging than usual, leaves pale green, often glandless. Crops moderate, one cause of its excellence. Origin, New York.

Green Catharine. Large, round, pale green, with a red cheek; flesh bright red at the stone, tender, juicy, rather acid. Season rather late; does not ripen rich as far North as the forty-third degree of latitude. Flowers small.

Grosse Mignonne.* Large, roundish, slightly oblate, apex depressed, with a deep suture; skin tinged with greenish-yellow, mottled with red, and with a purplish red cheek; flesh reddened at the stone, juicy, with a very rich, high, and somewhat vinous flavor; stone small, very rough. Early, the last two weeks of August. Of French origin. Flowers large. The peach usually cultivated in this country under this name, although an excellent variety, is not the genuine Grosse Mignonne, but differs in its small flowers.

Haines' Early Red.* Medium, round; flattened at apex, suture distinct; skin whitish, with a deep red cheek; flesh whitish, juicy, melting, sweet, excellent. Middle to end of August. Flowers small.

Hales' Early.* Medium, nearly round; skin mottled red, dark red cheek; flesh white, melting, juicy, and high flavored, free from the stone. Flowers large. Last of July and first of August. Tree vigorous, healthy, an abundant bearer, ripening ten days or two weeks before any other good variety.

Hastings Rareripe. Rather large, roundish, sometimes slightly flattened, skin yellowish-white, shaded purplish-red; juicy, excellent. Middle of September. Flowers small.

Jones' Early. Medium, roundish, suture shallow, distinct; yellow-

ish-white, with pale red; flesh slightly reddened at stone, juicy, rich, excellent. Twentieth of August. Staten Island, N. Y.

Large Early York.* (Early York, Honest John.) Large, roundish, inclining to oblate in fully grown specimens, nearly white in the shade, with red dots, and with a deep red cheek to the sun; flesh nearly white, fine-grained, very juicy, with mild, rich, excellent flavor. Flowers small.

The New York Rarripe * (a name which has been more or less applied to nearly all the early red peaches sent to New York market), or Livingston's New York Rarripe, is usually regarded as identical with the large Early York, but the late T. Hancock, of Burlington, considered them distinct, the New York Rarripe being rather superior, and ripening three days later.

Late Admirable. (La Royale, Bourdine, Têton de Venus, Judd's Melting, Motteux's, Late Purple *incorrectly*.) Quite large, roundish, inclining to oval, with a deep suture extending nearly round, and an acute swollen point at the apex; surface pale yellowish-green, with a pale red cheek, marbled with darker red; flesh greenish-white, red at the stone, juicy, delicate, flavor excellent. Flowers small. Season rather late. Of French origin.

Late Red Rarripe.* Large, roundish oval, apex marked with a depressed suture and sunken point; skin rather downy, pale grayish-yellow, spotted and thickly marbled, deep dull red to the sun, and with fawn-colored specks; flesh white, deep red at the stone, juicy, with a very rich and high flavor. The fruit is distinguished by its peculiar *grayish* cast. Flowers small. Season, the first two weeks of autumn. American.

Moore's Favorite. Large, roundish; white, with a blush; flesh white, rich, vinous. Stone small, free. Early in September. Massachusetts.

Morris' Red Rarripe. Large, roundish, apex slightly depressed, suture moderate, distinct; surface greenish-white, with a bright rich red cheek; flesh greenish-white, quite red at the stone, juicy, sweet, rich. Flowers small. Season, end of summer. Origin, Philadelphia. Differs from George IV. in its darker leaves, heavier crops, more even fruit, inferior flavor, and in ripening a few days later.

Morrisania Pound. (Hoffman's Pound.) Very large, nearly round, surface dull greenish white, with a brownish red cheek; flesh pale yellowish, juicy, tolerably rich. Late. Flowers small. Origin, New York.

Nivette.* Large, roundish, sometimes slightly oval, suture slight, apex but little depressed; surface light yellowish green, with a faint red cheek; flesh pale green, varying from pink to deep red at the stone, juicy and melting, and with a very rich flavor. Season medium, immediately preceding or ripening nearly with Morris White, and one of the best of its season for the North. Flowers small. Of French origin.

Oldmixon Freestone.* Large, roundish, slightly oval, one side swollen, suture visible only at apex; cavity shallow; surface a

pale yellowish white, marbled with red, with a deep red cheek when fully exposed; flesh deep red at the stone, tender, rich, excellent. Season medium, or the first of autumn. Flowers small. Succeeds well in all localities, and has few equals as a variety for the North, to succeed the early peaches.

President. Large, roundish oval, with little suture; skin very downy, yellowish-white, with a tinge of green, and a dull-red cheek; flesh nearly white, deep red at the stone, very juicy, and with a high flavor; stone rough, to which the flesh partially adheres. Flowers small. Ripens a little later than Morris White, or middle of September.

Scott's Early Red. Medium size, roundish, suture distinct, moderate; skin nearly white, mottled and covered with red; flesh very juicy, with a rich, fine flavor. Flowers small. Rather early, or end of summer. New Jersey.

Scott's Nectar. Large, roundish oblate; bright red on pale yellow; flesh white, sweet, excellent. Early in September.

Stetson's Seedling. Large, roundish, suture indistinct; crimson on greenish-white; flesh white, pink at the stone, juicy, rich, excellent. Last half of September. Massachusetts.

Stump the World.* Large, slightly oblong, red cheek; flesh white, with an excellent flavor, free from the stone. Flowers small. Ripens middle of the September, just after Oldmixon Freestone, which it resembles in size, appearance, and flavor.

Sweetwater, Early. (Downing.) Medium, roundish, suture slight; skin whitish, rarely with a faint blush; flesh white, slightly stained at stone, juicy, sweet, melting, agreeable. Ripens with Tillotson and Serrate Early York. Flowers large.

Troth's Early. (Troth's Early Red.) Small, round, red; flesh white, red at stone, not of first quality, but esteemed as a valuable early market variety—freestone. Flowers small. Early in August.

Van Zandt's Superb.* Size medium, roundish, one-half larger, suture slight; skin nearly white, with a beautifully dotted red cheek; flesh whitish, tinted with red at the stone, juicy, sweet, of fine pleasant flavor. First of autumn. Origin, Flushing, Long Island. Flowers small.

Walter's Early. Rather large, roundish; surface nearly white, with a rich red cheek; flesh whitish, touched with red at the stone, juicy, sweet, of fine flavor. Ripens the last week of summer. Flowers small. A native of New Jersey, and is a valuable peach at the North.

Ward's Late Free.* Large, not quite of the largest size, roundish; surface dull yellowish-white, with a red cheek, nearly the color of the Oldmixon Free, but not so clear nor bright; flesh nearly white, of excellent flavor. One of the finest late peaches of the Middle States. Flowers small.

Washington. (Washington Red Freestone.) Large, somewhat oblate, with a broad, deep suture passing nearly round; skin thin,

yellowish-white, with a deep crimson cheek; flesh nearly white, tender, juicy, sweet, rich. Stone small, to which the flesh slightly adheres. Rather late. Flowers small. Origin, New York.

White Imperial. Rather large, roundish, often slightly oblate, depressed at apex, suture moderate; surface pale yellowish-white, often with a faint tinge of green; slightly tinged and sometimes striped with light purple to the sun; flesh very juicy, delicate, sweet, excellent. Flowers small. A uniform moderate bearer, and a valuable peach at the North, but worthless in Virginia. Ripens rather early, or latter part of August. Origin, Cayuga County, N. Y.

Section III. Leaves with reniform glands.

Baldwin's Late. Large, oblong, pointed at apex; greenish white, with a slight red cheek; flesh firm, juicy, good. End of October, keeping well. Flowers small. Southern Alabama.

Baugh. Medium, roundish, slightly pointed, suture obscure; flesh yellowish-white, quite white at the stone; melting, juicy, with a sweet, pleasant flavor—free from the stone. First of October. Georgia.

Brevoort.* (Brevoort's Morris, Brevoort's Seedling Melter.) Medium or large, round, and slightly oblate, suture distinct, deep at apex; skin nearly white or with a faint dingy hue, with a bright-red cheek; flesh rather firm, slightly red at stone, rich, sweet and high flavored. Flowers small. First of autumn. Moderately and uniformly productive. Origin, New York.

Chancellor. (Late Chancellor, Noisette.) Large oval, suture distinct; skin nearly white, with a dark crimson cheek; flesh deep red at the stone, with a rich, vinous flavor, stone oblong. Flowers small. Late. Of French origin.

Columbus June. Medium to large, flattened at apex; skin pale yellowish-white, with a rich, red cheek; flesh slightly reddened at stone, melting, of excellent flavor. Flowers small. Georgia, where it ripens the twentieth of June.

Early Newington Freestone. Size medium, roundish, one-half always larger, suture distinct; surface nearly white, dotted and streaked with red, the cheek a rich red; flesh white, red at the stone, at first wholly adhering, but as it ripens partially separating from it, juicy, rich, fine. Flowers small. A valuable early variety, ripening immediately after the Serrate Early York.

Early Purple. (Pourprée Hâtive, Pourprée Hâtive à Grandes Fleurs.) Size medium, globular, depressed, a deep suture across the apex; skin light yellow, with a mottled, purplish-red cheek; flesh red at the stone, melting, juicy, with a high flavor; stone broad and rough; season early, or middle or latter part of August. Flowers large. Rare in this country. The Serrate Early York has been propagated under this name in portions of this country, and the Grosse Mignonne in Europe; from both of which it differs in the glands of its leaves.

Henry Clay. Very large, deep purple in sun; flesh grayish-white, delicate, tender, peculiar flavor. First of August at the South, September at the North. Mississippi.

Jones' Large Early. Large, roundish, flattened at ends, suture deep; skin white, shaded deep crimson; flesh white, pink at stone, juicy, rich, excellent. Middle of August. Staten Island, N. Y.

Kenrick's Heath. (Freestone Heath.) Very large, oblong, suture slight, apex pointed; surface pale greenish-white, with a purplish red cheek; flesh deep red at the stone, rather coarse, very juicy, sub-acid, often poor; when well grown on some localities, it proves a good sub-acid peach. Flowers small. Season medium, or rather late. New England. Valued for drying.

Lady Parham. Large, roundish, suture distinct, yellowish-white, downy; flesh pale, red at the stone, firm, with a rich, vinous flavor. October. Georgia.

La Grange. Large, oblong, surface pale greenish-white, rarely tinged with red by the sun; flesh juicy, with rich, fine flavor. Flowers small. Quite late. Origin, Burlington, N. J., and does not attain a fine flavor much farther North.

Montgomery's Late. Large, round, skin downy, yellowish-white, with a dull red cheek; flesh whitish, red at stone, juicy, melting, very good. September. Georgia.

Morris White.* (Morris' White Rareripe, White Rareripe, Lady Ann Steward.) Rather large, roundish, or roundish-oval, often obscurely obovate or a little larger toward the apex, suture small; surface rather downy, of a pale creamy white at maturity, rarely tinged with purple to the sun; flesh slightly firm, wholly white, very free from the drab stone, melting, juicy, with a good, rich flavor; hardly of the highest quality at the North, better in the Middle States; very popular everywhere. Season medium, or early in autumn.

Cole's White Melocoton, as usually cultivated, is a synonym; but when genuine, is quite distinct, according to the late T. Hancock, being larger, heavier, and rounder, and ripening two weeks later. Flowers small.

President Church. Large, roundish-oval, suture slight; pale red in shade, dark red in sun, handsome; flesh white, pale red at stone, very juicy, melting, and of delicious flavor. Middle of September. Georgia.

Scott's Magnate. Large, roundish-oblato; pale yellow, with a dark red cheek; flesh white, very good. Early in September.

Snow. Large, globular, suture distinct only at apex; skin thin, wholly white; flesh white to the stone, juicy, sweet, rich. First of autumn. Flowers small. Very variable, sometimes worthless for the table. A beautiful peach for preserving.

Strawberry. (Rose.) Size medium, oval, cavity deep, suture passing half round; surface mostly marbled with deep red; flesh whitish, melting, rich, of fine flavor. Flowers small. Early.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves crenated, with globose glands.

Baltimore Beauty. Rather small, round-oval; skin deep orange, with a bright-red cheek; flesh yellow, red at the stone, sweet, good, mealy when over-ripe. Quite early. Flowers large. Origin, Baltimore, where it is good, but it proves of third-rate quality at the North.

Barnard.* (Early Barnard, Yellow Barnard.) Rather large, roundish, suture distinct, mostly covered with dark brownish-red; flesh deep yellow, red at stone, juicy, rich, very good. Tree hardy and a great bearer. Flowers small. This is a seedling of the Yellow Alberge, which it much exceeds in quality.

Crawford's Early.* (Early Crawford, Crawford's Early Melocoton.) Very large, oblong-oval, sometimes round-oval; apex with a prominent point, suture shallow, surface yellow, with a red cheek; flesh very juicy, rich, slightly sub-acid, of good but not the highest flavor. End of summer and beginning of autumn. Productive. Flowers small. Ranks very high in the Northern, Middle, and Western States, as a market variety. Origin, New Jersey.

Crawford's Late.* (Crawford's Late Melocoton.) Very large, roundish, suture shallow, distinct; surface yellow, with a broad, dark-red cheek; flesh red at the stone, rich, juicy, vinous, hardly first-rate. Quite late, or latter part of September. Flowers small. Origin, New Jersey. The common Red Cheek Melocoton is cultivated in some localities under this name. Often a poor bearer.

Elberta.* Medium to above average size, round-oval, strongly sutured; lemon yellow, blush on sunny side; flesh pale yellow, tender, juicy. Tree vigorous, large leaves, hardy. A cross of Chinese Cling and Crawford Early. A good shipper. One of the best of the new varieties. Origin, Georgia.

Hatch. Roundish, pointed, suture shallow, red on deep yellow; sweet, excellent. First of September. Connecticut.

Jagues' Rareripe.* Very large, roundish, slightly oblate, suture distinct, one side slightly larger, surface a little uneven; surface deep yellow, variously shaded with red; flesh deep yellow, red at the stone, of good but not of the highest flavor. Shoots diverging. Flowers small. Ripens at the end of summer. Origin, Massachusetts.

Lincoln. Large, roundish, suture large; skin downy, mostly dark purplish red; flesh tinged with red at stone, juicy, excellent. Through September. Massachusetts.

Merriam. Very large, roundish oval, with a bright red cheek; melting, juicy, sweet, rich. First of October.

Mrs. Poinsette. Large, globular; skin yellow, brown to the sun; flesh juicy, melting, rich, excellent. South Carolina, where it ripens early in August.

Poole's Large Yellow. Large, roundish, suture half round; dark red on deep yellow; flesh yellow, red at stone, rich, juicy, very good. Last of September. Near Philadelphia, Pa.

Red Cheek Melocoton. Large, roundish-oval, with a point at apex; surface yellow, with a deep red cheek; flesh red at the stone, juicy, with a good, rich, vinous flavor, not of first-rate quality. Ripens rather late, or during the last half of September, in the Middle States about the first of autumn. Flowers small. Extensively cultivated as a market peach.

Reeves' Favorite. Large, roundish-oval, pointed, with a fine red cheek; melting, vinous, good. Middle of September. New Jersey.

Scott's Nonpareil.* Large, roundish, slightly oblong; surface deep yellow with a red cheek, resembling Crawford's Late, but sweeter. Flowers small. Origin, Burlington, N. J., where it ripens about the 12th of September.

Tuft's Rareripe. Medium, roundish, with a bright-red cheek, melting, sweet, rich. Last half of September.

Yellow Alberge. (Purple Alberge, Yellow Rareripe *erroneously*.) Size medium, roundish, suture distinct, passing half round; skin yellow, with a deep purplish red cheek; flesh deep red at the stone, juicy, sweet, pleasant, of moderate flavor.

Yellow Admirable. (Abricotée, Admirable Jaune, Orange Peach, Apricot Peach.) Large, roundish-oval, suture small, and on one side only; surface wholly yellow, or faintly reddened next the sun; flesh slightly red at the stone, firm, and rather dry; flavor sweet and agreeable, stone small; season very late. Flowers large. Of French origin. Adapted to the Middle States.

Yellow Rareripe.* (Large Yellow Rareripe.) Large, roundish, suture a little sunken, extending more than half around, with a small point at apex; skin deep orange yellow, with a rich red cheek with faint streaks; flesh deep yellow, red at the stone, juicy, melting, with a very good vinous flavor. Stone small. End of August. Flowers small.

Section II. Leaves with reniform glands.

Bergen's Yellow.* Very large, round, slightly oblate; suture distinct, passing more than half round; surface deep orange, with a broad deep red cheek; flesh juicy, rich, excellent. Ripens the first of autumn. Flowers small. This is perhaps the finest of all yellow-fleshed peaches. Origin, Long Island, N. Y. It differs from the Yellow Rareripe in its more oblate form, darker color, superior flavor, and later maturity, and in its reniform glands. Tree of feeble growth.

Columbia. Large, roundish-oblate; suture distinct, passing half way round; skin rough, rather thick, dull dingy red, with spots of darker red; flesh yellow, rich, juicy, of excellent flavor. Origin, New Jersey. Ripens early in autumn. Shoots dark reddish purple. Flowers small.

Smith's Favorite. Large, roundish; suture deep; deep rich red on yellow; juicy, rich, very good. Last half of September. Valuable.

Smock Freestone. Large, oval, base rather narrow; orange-red on yellow; flesh bright yellow, red at stone; moderately juicy and rich. Good drying variety. First of October. New Jersey.

Susquehanna. Very large, nearly round; skin rich yellow, with a red cheek; flesh sweet, juicy, rich, vinous. First to middle of September. Pennsylvania.

DIVISION II.—CLINGSTONES OR PAVIES.

CLASS I. FLESH PALE OR LIGHT-COLORED.

Section I. Leaves serrated, without glands.

Old Newington. (Newington, Large Newington.) Large, roundish, suture slight; surface nearly white, with a fine red cheek, somewhat streaked with darker red; flesh nearly white, deep red at the stone; partly melting, juicy, rich. Season rather late, or middle of September. Flowers large.

A sub-variety, cultivated to a considerable extent in this country, has *globose glands*.

Smith's Newington. (Early Newington.) Size medium, roundish oval, narrower at apex, one side slightly enlarged; surface pale yellow, with a lively red cheek, streaked with purple; flesh bright red at the stone, juicy, good. Ripens end of summer. Flowers large.

This is of English origin, and is quite distinct from the Early Newington Freestone, a *melting* (not *firm-fleshed*) peach, often adhering to the stone.

Section II. Leaves crenate, with globose glands.

Large White Clingstone.* Large, round, suture slight, point at apex small; skin white, dotted with red, or with a light-red cheek next the sun; flesh very juicy, sweet, rich, and high-flavored. Season, early in autumn. Flowers small. Origin, New York.

Oldmixon Clingstone.* Large, roundish-oval, suture distinct only at apex, fruit slightly larger on one side; surface yellowish-white, dotted with red, or with a red cheek; flesh juicy, rich, with a high flavor. Flowers small. Ripens first of autumn. This is one of the finest of clingstone peaches.

Section III. Leaves with reniform glands.

Catherine Cling. Large, roundish-oval, swollen most on one side, with a small point at apex; surface pale yellowish-green, thickly

dotted and with a cheek of red, with darker streaks; flesh firm, dark red at the stone, juicy, rich, fine. Season late. Flowers small. Of English origin. The fruit of this variety and of the Old Newington and Oldmixon Cling considerably resemble each other, but all differ in the glands of the leaves.

Chinese Cling. Large, globular, suture shallow; fine red on yellowish white; flesh white, red at the stone, rich, vinous, excellent. Middle of September—middle of summer at the South. China.

Donahoo Cling. Very large, roundish, suture deep on one side; creamy white, tinged red in the sun; flesh white to the stone, juicy, rich, excellent. Georgia, where it ripens middle of September.

Hyslop. Large, roundish oval; crimson on white; juicy, rich, vinous. First of October.

Heath.* (Heath Cling, White Heath, White English, Eliza Thomas, Potters' September, Rany, White Globe.) Very large, oblong-oval, the largest specimens nearly round, with a large, conspicuous point at the apex; suture distinct on one side; surface quite downy, pale yellowish-white, sometimes faintly tinged with red next the sun; flesh exceedingly juicy, becoming melting, with a sweet, very high, rich, and excellent flavor; leaves large, wavy, deep green, slightly crenate. Flowers small. Season very late, about mid-autumn, and the fruit may be kept nearly till winter. At the North it matures fully in the warmest seasons only; and never attains its full size, which is about three inches in diameter, unless much thinned on the branches, to effect which a thorough shortening-in is the best mode. Origin, Maryland. Tree quite hardy and vigorous. In Southern Virginia, the Heath is rather an uncertain peach, but when perfect it ripens there the first fortnight in autumn. It is known also as Henrietta, but should not be confounded with a yellow peach of this name.

Pavie de Pompone. Very large, roundish-oval, suture distinct on one side; a deep red cheek on yellowish-white ground; flesh deep red at stone, juicy, sweet, good. Flowers large. First of October. French.

Rodman's Cling. (Red Cling.) Large, oblong; red next the sun; flesh whitish, firm, juicy. Last of September. Flowers small. American.

Shanghae. Large, oval, flattened, suture distinct, deepened at apex; skin greenish-yellow, shaded pale red; flesh greenish-yellow, melting, juicy, with a high, vinous flavor. First half of September.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves serrate, without glands.

Orange Clingstone. Large, round, suture distinct, passing nearly round, with no point at the apex; surface deep orange, with a dark-red cheek; flesh rather firm, rich, juicy, vinous. Season, early in autumn. Flowers small.

Section II. Leaves with reniform glands.

Blanton Cling. Large, oval, pointed; skin rich orange, with a slightly reddened cheek; flesh orange-yellow, firm, vinous, good.

Lemon Clingstone.* (Kennedy's Cling, Pine-Apple Cling, Yellow Pine-Apple.) Large, oblong-oval, slightly narrowed at apex, terminated by a large prominent point; surface deep yellow, with a dark brownish-red cheek; flesh firm, slightly red at the stone, with a rich, vinous, sub-acid flavor. Flowers small. Rather late. Tree productive, hardy. Origin, South Carolina.

Tippecanoe.* Large, nearly round, slightly compressed; surface yellow, with a red cheek; flesh yellow, juicy, vinous, good. Quite late. Flowers small. A native of Philadelphia; of little value much farther North. New.

Washington Clingstone. Size medium, roundish; surface yellowish-green, with gray specks, and with a slight tinge of red to the sun; not handsome; flesh very tender, sweet, high-flavored. Flowers small. Quite late.

CLASS III. FLESH PURPLISH CRIMSON.

Section I. Glands reniform.

Blood Clingstone. (Claret Clingston, Blood Cling.) Large, often very large, roundish-oval, suture distinct; skin quite downy, dark, dull, clouded, purplish-red; flesh deep red throughout, firm, juicy, only valuable for culinary purposes. Flowers small.

The French Blood Clingstone, the parent of the preceding, only differs from it in its smaller size and large flowers.

The Blood Freestone is much smaller and of no value.

CHAPTER XXIX.

THE PEAR.

THE Pear, when grown to full perfection, is distinguished for its great delicacy, its melting and juicy texture, and its mild, rich, and delicious flavor. Excelling the apple in these particulars, it falls below it in importance in consequence of the less uniformly healthy habit of the tree.

PROPAGATION.

The best trees are raised from seedling stocks; suckers, unless unusually furnished with fibrous roots, are of crooked, one-sided, and stunted growth.

Raising the Seedlings.—The seeds, after separation from the fruit, should be kept as already described for apple-seeds, by mixing with sand or leaf-mould. The soil for the seed-bed should be unusually deep and fertile, rather damp than otherwise, and should have a good manuring with lime and ashes and an abundant supply of peat or muck, if the soil is not already largely furnished by nature with this ingredient.

The mode of sowing the seeds may be the same as that described for the apple, in drills from one to two feet apart. The more thinly they are sown, the less will be the danger of disaster from the leaf-blight; and for this reason, drills near together, with the seeds somewhat sparingly scattered in them, will be found best.

The leaf-blight is the most serious evil met with in the culture of pear-seedlings. It is more formidable in some seasons than in others. Commencing about midsummer, sometimes earlier, but more frequently later, it is first indicated by the leaves in certain parts of the seed-beds turning brown; in a few days they fall off; other portions of the beds are succes-

sively attacked, till all the seedlings become more or less denuded, those last affected occupying the most favorable portions of the soil. As a necessary consequence, growth immediately ceases; and if they are attacked early, and have made but little previous growth, they are nearly ruined, and few will survive the succeeding winter, for they never make a second growth the same year of any value. But if their previous growth has been vigorous, and the blight appears late in summer, much less injury is sustained. The best remedy is high cultivation, on good new soil, and taking out daily every diseased tree.

Wintering the Young Seedlings.—The frequent destruction of the trees the first winter is another serious evil. The danger is least with those that have made the best well-ripened growth; hence it becomes very important to secure healthful vigor by the adoption of the cultivation previously mentioned. But in many localities, pear seedlings, which are always remarkably free from fibrous or lateral roots the first year, are drawn out by the freezing of the soil, and either destroyed or greatly injured. Several modes have been proposed to prevent this result, and have been tried to a greater or less extent. One is to induce the emission of lateral roots, by taking up the young seedlings from the thickly sown beds early in the season, and, as soon as four leaves have appeared, cut off their tap-roots and reset them in the nursery-rows. Robert Nelson, of Newburyport, Mass., pursued this course with great success; but its general utility may be questioned, except during a rainy period or on favorable soils, unless abundant watering is given. A more easy as well as safe mode would perhaps be to cut off the tap-roots, at the same age, by means of a sharp spade thrust beneath the soil, and without transplanting. Neither of these modes could be successfully applied except to large, vigorous seedlings growing in deep, rich soil.

But where the growth of lateral roots has not been effected, and the consequent danger is greater of their being drawn upward by frost, much protection may be given them by covering the whole ground with forest leaves to a depth of several inches; and, if the rows are near each other and the trees several inches or a foot high, they will prevent the leaves from being swept off by the winds. The incursion of mice

may be avoided by placing the seed-beds as near as practicable to the middle of a clean ploughed field, and by encircling the ground with a bank or ridge of fresh earth thrown up for this purpose, about a foot high. Mice will not pass such a boundary under the snow.

Taking up the seedlings late in autumn, and burying them in a cellar, or laying them in by the roots and nearly covering the whole stems, will preserve them safely.

Budding may be performed the first summer after transplanting if the stocks have made a good growth. The management of the young trees is the same as for apples, by grafting or budding near the surface of the ground, and heading down, trimming, and cultivation. But as pear-stocks are valuable, budding is to be preferred to grafting, because it may be repeated in case of failure. Root-grafting, in the mode adopted for the apple, nearly always fails. It is successful when large, entire, and branching roots are taken, and the grafts inserted above the crown.

DWARF PEARS.

For orchard culture, and in most parts of the country where the pear flourishes with great vigor and proves highly productive, pear-stocks will doubtless always be found preferable to all others. The advantages of a dwarf growth on dissimilar stocks have been already pointed out under the head of *stocks*. Such trees are not so long-lived as on pear-roots, and they require more thorough and fertile culture, and care in pruning. But they have some important advantages, such as coming soon into bearing, occupying a fifth part of the ground, thriving in many soils where pear-stocks will not, and in a few instances improving the quality of the fruit.

The only reliable stock is the French quince. Nearly all the experiments with the mountain ash have sooner or later proved failures. Budded or grafted upon apple seedlings, pears sometimes make a feeble growth for a few years; but unless the grafts themselves throw out roots, by planting beneath the surface, they sooner or later perish. It sometimes happens that grafts of a few varieties inserted at standard height grow and bear for a few years. The thorn has been used in England, and to some extent in this country, with

partial success. But all other kinds of dissimilar stocks have given way to the *quince*, which is much superior for general use to any other.

The varieties of the pear do not grow with equal facility upon the quince. A few, as the Angoulême, Louise Bonne, and Diel, are so much improved in quality that their cultivation on pear-stocks is discontinued by most fruit-growers. A large number flourish well, but are little changed in quality, as White Doyenné and Dearborn's Seedling. A few, on the other hand, succeed badly or wholly refuse to grow upon quince stocks, without *double working*, which consists in first budding some freely growing pear upon the quince bottom, and then budding or grafting the "refractory" sort into the pear-shoot.

As a general rule, double-worked trees do not flourish for a great length of time. Single-worked have done well for thirty or forty years under favorable influences.

The following list, made out chiefly from the combined experience of European and American cultivators, may prove valuable to those commencing with dwarf pears:

I. Pears succeeding better on quince than on pear stocks, and which should be mostly worked as dwarfs.

Amalis.	Glout Morceau.
Angoulême.	Long Green of Autumn.
Diel.	Louise Bonne.
Easter Beurré.	Vicar of Winkfield.

II. Pears usually succeeding well, both on pear and quince.

Anjou.	Compte de Lamy.
Bergamotte Cadette.	Dearborn's Seedling.
Bloodgood.	Delices d'Hardenpont.
Boussock.	Doyenné d'Alençon.
Buffum.	Duchesse d'Orleans.
Capiaumont.	Early Rousselet.
Catillac.	Epine Dumas.
Chaumontelle.	Forelle.
Colmar.	Figure.

Figue d'Alençon.	Rostiezer.
Jaminette.	Soldat Laboureur.
Jargonelle.	Sterkmans.
Jersey Gratioli.	Stevens' Genessee.
Josephine de Malines.	St. Germain.
Kingsessing.	St. Michael Archange.
Langelier.	Summer Franc Real.
Madeleine.	Superfin.
Napoleon.	Triomphe de Jodoigne.
Nouveau Poiteau.	Tyson.
Osband's Summer.	Urbaniste.
Oswego.	Van Mons' Leon Le Clerc.
Pound, or Uvedale's St. Germain.	White Doyenné.

III. *Pears growing on quince but better on pear stocks.*

Aremberg.	Gray Doyenné.
Bartlett.	Onondaga.
Belle Lucrative.	Seckel.
Été.	

IV. *Pears usually failing on quince, unless double-worked.*

Bosc.	Paradise d'Automne.
Dix.	Sheldon.
Dunmore.	Washington.
Gansel's Bergamot.	Winter Nelis.
Marie Louise.	

The result is not always the same in different soils and in different seasons. The Seckel, for instance, has wholly failed in one year, and in another, on the same spot of ground, has grown well. The White Doyenné grew finely one summer, and almost totally failed the next. Some sorts which in nearly all cases do well occasionally prove unsuccessful. A few uniformly, in all seasons and in all soils, make a rapid and vigorous growth, of which the Louise Bonne is perhaps the most striking example; some others, again, invariably fail (unless double-worked), the most prominent among which stands the Bosc. Indeed, so averse is this variety to a union

with the quince, that it is by no means certain that it may not soon fail if worked in whatever manner. In some places, however, double-working has given it smooth and fair fruit where it has been cracked and blighted on the pear. Both this and the Flemish Beauty, as well as the Marie Louise and some others, succeed well when grafted on the hawthorn.

The changes wrought by the quince stock are often important and interesting. T. Rivers states that the d'Aremberg

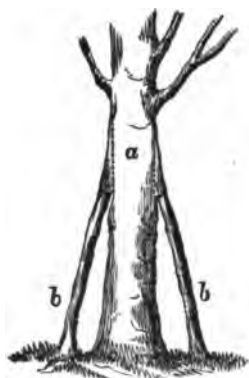


FIG. 603.



FIG. 604.

a, Trunk of Dwarf Pear-Tree; *b, b*, Pear-Stocks Inserted into it for New Bottom; *c*, Cut for Receiving the Pear Stock; *d*, Pear Stock, Cut Sloping before Insertion.

ripens several weeks earlier in winter; that the Easter is rendered more productive and matures its fruit, while on the pear it is a bad bearer, and does not ripen; that the *Fortunée* is a "perfect crab" upon the pear, but on the quince is melting and juicy; that the *Glout Morceau* is imperfect and ripens badly on the pear, but is always fair and attains a high and mature flavor on the quince. As a general effect, the size of the fruit is increased, but in a few cases it is rendered more gritty in texture.

Pruning Dwarf Pears.—Dwarf pear-trees are usually pruned into the *pyramidal* and *conical* form, the latter differing only in its broader shape. The principle to be adopted in pruning has been already explained on a former page; the extent to which it must be carried should be such as to keep the trees

within ten or twelve feet in height, and six or seven feet in diameter at the base. A greater height increases the difficulty of pruning. The same reason forbids the adoption of a head with a clean stem below, as in common standards.

The pyramidal mode of pruning may be applied to pear-trees upon pear stocks. Dwarf trees may be planted from ten to twelve feet apart. They will always need careful attention to pruning, and to thorough and enriched cultivation of the ground.

In planting out the dwarf pear, the quince stock should be planted a little below the surface to elude the borer, which often attacks the quince, but rarely the pear. It is sometimes planted deeper for the purpose of causing the pear to throw out roots of itself, thus changing the dwarf to a standard. This practice is objectionable, as such roots are apt to be few or one-sided, inclining or prostrating the tree. It is also desirable to retain the bearing character of the dwarf.

When dwarfs become old, or begin to decline, pear-roots may be given to them, and renewed vigor imparted, by planting a small pear tree closely on each side, and, when these become established, by inarching them into the tree, as shown in the annexed cuts. It is performed as follows:

Make a slit in the bark of the dwarf pear-tree, a few inches above ground, and across the lower end of the slit make a cross-cut, so as to form an inverted **L**. If the tree is large, make a notch instead of the cut, sloping downward, the better to admit the stock. Then bend the stock against this notch or cross-cut, and mark it at that point. Then, with a knife set with the edge upward at this mark, cut the stock off with a slope two or three inches long. It is then easily bent and inserted into the slit (see Figs. 603 and 604). It may be covered with grafting-wax, but grafting-clay is much better. This is made of clay or clay-loam one part, and horse-manure two parts, well mixed together—the addition of a little hair is an improvement. Cow-manure is entirely unfit, being too compact with the clay, and not possessing the fibrous character of the other.

Horizontal training, for walls or espaliers, is very rarely practised or needed in this country. It is occasionally employed in limited gardens, to form boundaries of walks, without occupying much lateral space, and where it is desired to

grow large and fine specimens of fruit by strong exposure to the sun. The mode may be briefly understood by the accompanying figure representing a partly grown tree (Fig. 605). As the tree advances, shoots will be produced from the sides of the horizontal arms; these must be stopped or pinched off early in summer, to prevent their drawing too hard on the rest of the tree, and a similar course pursued with them to that



FIG. 605.—Horizontal Training of Pear-Trees.

already described in a former chapter. The fruit-buds, and all the shoots or spurs supporting fruit-buds, are to be cut closely off wherever too thick for an even crop. Early in autumn the shortened shoots are to be cut down, leaving the fruit-buds only, to bear the next season. By this regularity of pruning, the tree will preserve a neat appearance, and bear regular crops.

The horizontal branches may be about one foot apart for large pears, and eight inches for small; and the trees, if on quince-roots, may be about ten feet apart.

Regrafting Large Pear-Trees.—Some of the varieties described in the following pages have already shown indications of becoming generally affected by cracking, and this disease may render a part of them worthless. In such cases it becomes desirable to regraft them with valuable sorts.

The old and common way is to cut off the trunk or a few of the larger limbs, and insert a few grafts, say four or five in all, and compel them to form the whole new head, requiring the lapse of many years. A much better and more expeditious mode is to scatter the grafts through the top—inserting

so many that, each one forming a small branch of itself, the whole taken together will make a full top in a few years.

In order to render the operation plain, Fig. 606 is made to represent the unchanged tree at an age of from ten to twenty years. All the smaller branches are cut away, and those of medium size left distributed at as regular distances as may be. As the tendency of the growth is upward, the top should be rather worked downward in this operation, and the side



FIG. 606.



FIG. 607.



FIG. 608.

limbs near the bottom allowed a full chance. In the ends of these shoots some thirty or forty grafts are set, as shown in Fig. 607. Trees of the Virgalieu or Doyenné, which had become worthless by cracking, and which were large enough to bear a bushel or two annually, have been entirely changed in this way to better sorts, and yielding three years afterward larger crops than ever.

If the labor of inserting so many grafts is too great for ordinary practice, one-third or less may be set, as shown in Fig. 608.

Dwarf pear-trees of undesirable varieties may be readily changed in this way to other sorts—the more easily because they are lower, and accessible from the ground. Old dwarf

trees, which have become enfeebled by long bearing and sparse pruning, may be thus rendered thrifty and vigorous.

With trees of large size, it may be safest to change the upper half in one year, and the remainder the next, for the purpose of avoiding too great a check in growth.

Younger trees, or those but a few years old, of undesirable sorts, but of straight growth, may be used for stocks on which to work new heads of crooked or slow growers at standard height. Fig. 609 represents a tree of the Virgalieu worked over to the Winter Nelis, the former being a straight and handsome tree, and the latter the most crooked grower known. A few buds of the Winter Nelis are inserted into the side limbs of the Virgalieu so as to form an even, well-balanced head. The same result may be obtained by grafting these limbs in spring.



FIG. 609.

SYNOPSIS OF ARRANGEMENT.

DIVISION I. SUMMER PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

DIVISION II. AUTUMN PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

DIVISION III. WINTER PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

FURTHER CLASSIFICATION OF FORMS.

In addition to the several general forms mentioned in the preceding synopsis, the shape is more particularly designated by comparison with well-known sorts. No fruit has so many forms as the pear in its different varieties; and to assist the fruit-grower in preserving a recollection of the distinctive characters of each, these forms are classified in the following pages. The distinction between pyriform, obovate, and oblate, which constitute the three principal divisions, has been already pointed out in the chapter on describing fruits; but there are many subdivisions, or less distinct modifications, which, if accurately observed, would additionally distinguish the different varieties. For example, PYRIFORM pears may be divided into *Bartlett-shaped*, where the general form is oblong, but both body and neck rounded and obtuse; *Winkfield-form*, longer and less obtuse; *Bosc-shaped*, when the body is broad and the neck long and narrow; *Tyson-form*, similar to Bosc, but with a shorter and acute neck; *Urbaniste-form*, shorter and less distinctly pyriform; *Diel-shaped*, where the body is large and rounded, and the neck short and obtuse; *Madeleine-shaped*, similar to the last, but of smaller body and lighter form.

Obovate pears may be either *Doyenné-form*, when they slightly approach pyriform; *Buffum-shaped*, or distinct obovate, when gradually rounded toward the stem with no approach to a neck; or *Bloodgood-shaped*, similar to the last, but often shorter and tapering, or rounded into the stalk.

These forms are, of course, more or less variable in the same varieties, but those more generally prevailing are adopted.

The illustrations of fruits in this chapter are all reduced one-half in diameter.

PYRIFORM.—Bartlett-shaped.

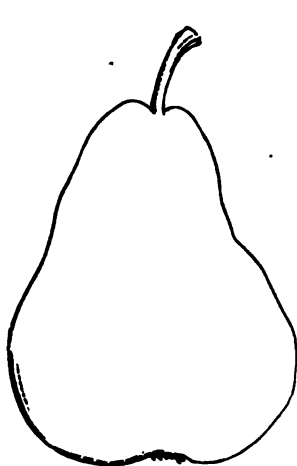


FIG. 610.—Bartlett.

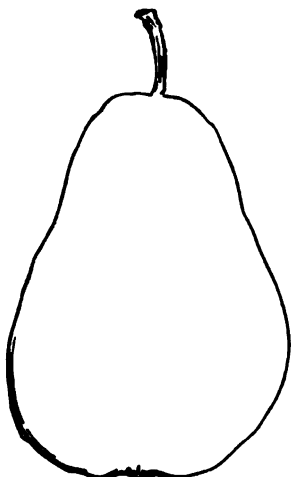


FIG. 611.—Duval.

Winkfield-shaped.

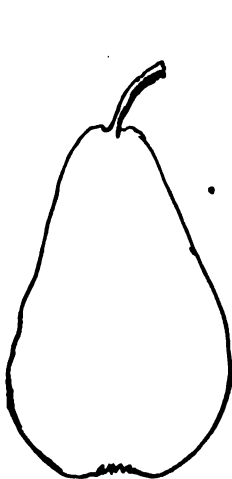


FIG. 612.—Emile d'Heyst.

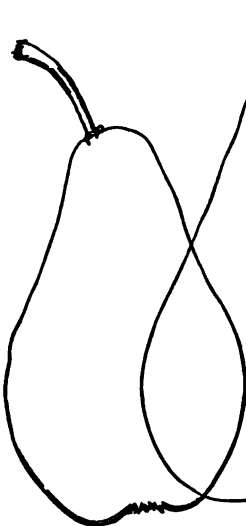


FIG. 613.—Winkfield.

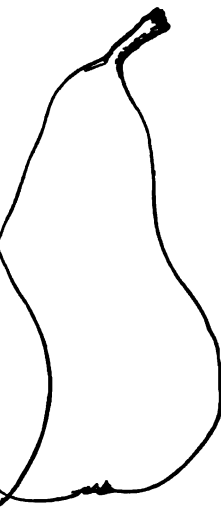


FIG. 614.—Verte Longue.

PYRIFORM.—Bosc-form.

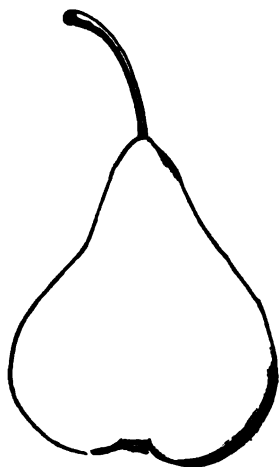


FIG. 615.—Bosc.

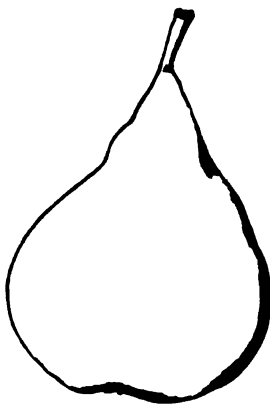


FIG. 616.—Dupuy Charles.

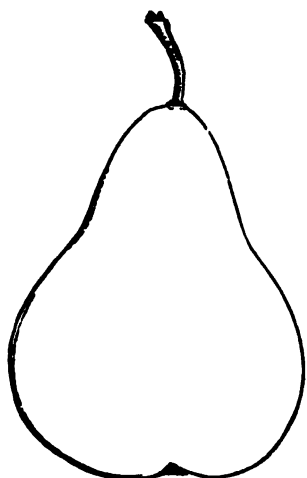


FIG. 617.—Conseiller de la Cour.

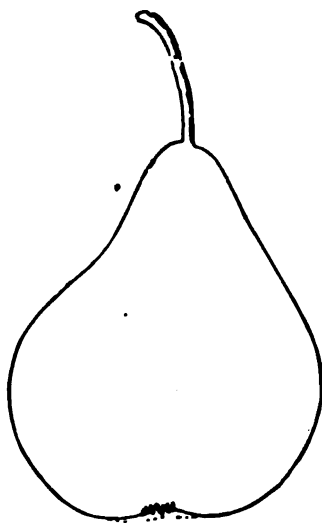


FIG. 618.—Pound.

PYRIFORM.—Diel-shaped.

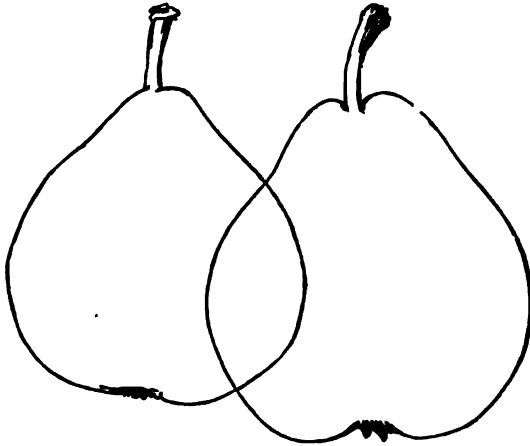


FIG. 619.—Comice.

FIG. 620.—Diel.

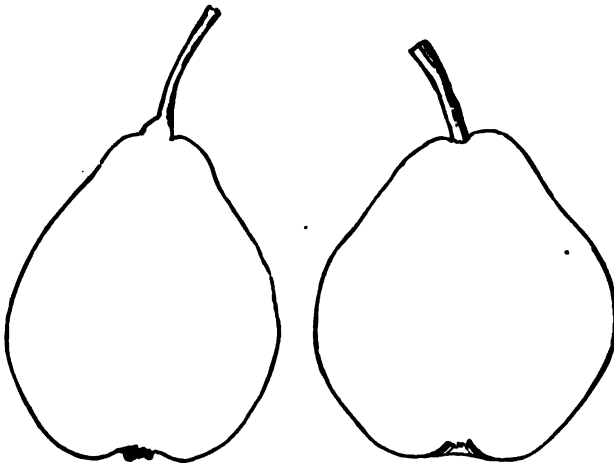


FIG. 621.—Onondaga.

FIG. 622.—Black Worcester.

PYRIFORM.—Tyson-shaped.

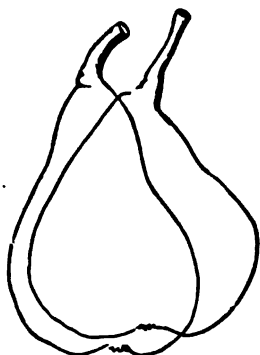


FIG. 623.—Brandywine (two outlines).

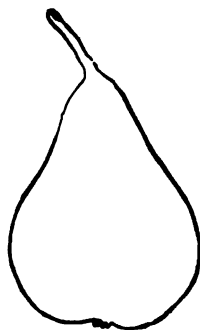


FIG. 624.—Las Canas.

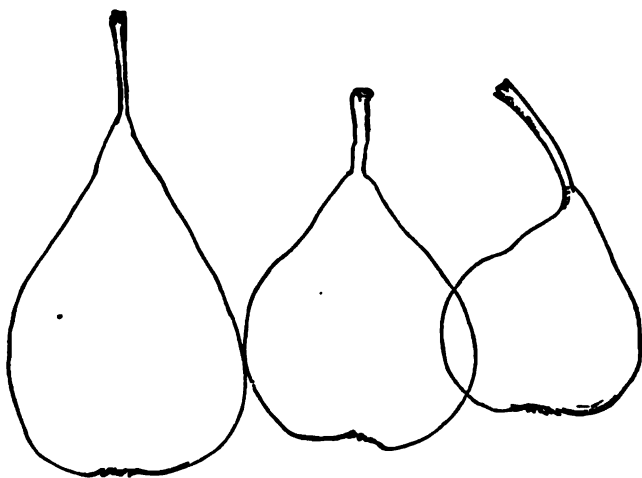


FIG. 625.—Wilmington.

FIG. 626.—Rosabirne

FIG. 627.—St. Ghislain.

OBOVATE-PYRIFORM.—Urbaniste-form.

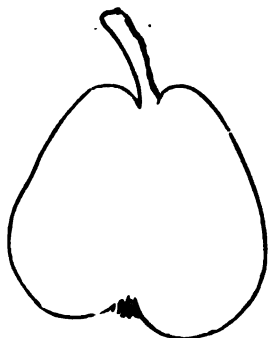


FIG. 628.—Urbaniste.

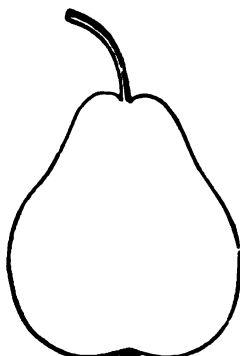


FIG. 629.—Pratt.

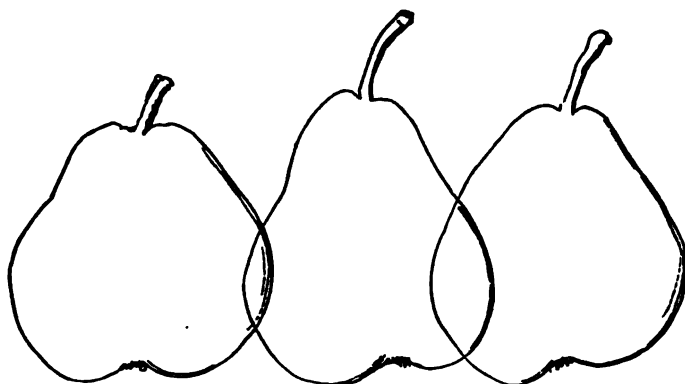


FIG. 630.—Kingsessing.

FIG. 631.—Kennes.

FIG. 632.—Langelier.

OBOVATE-PYRIFORM.—Madeleine-form.

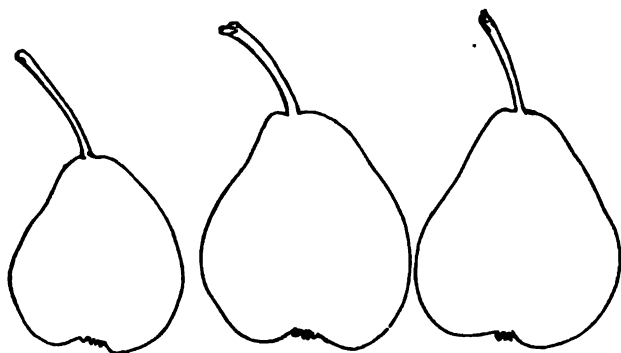


FIG. 633.—Madeleine.

FIG. 634.—Alpha.

FIG. 635.—Inconnue Van Mons.

OBOVATE.—Doyenné-form.

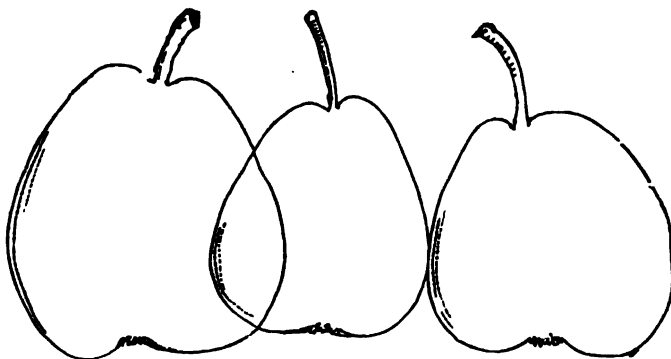


FIG. 636.—Boussock.

FIG. 637.—Cushing.

FIG. 638.—Defais.

OBOVATE.—Buffum-shaped.

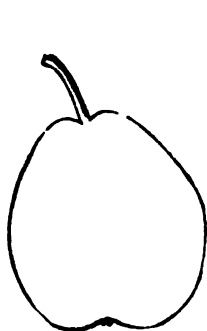


FIG. 639.—Heathcot.

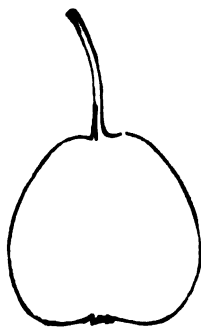


FIG. 640.—Lewis.

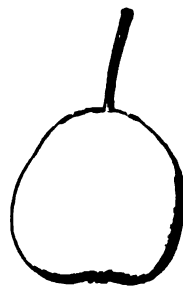


FIG. 641.—Dearborn's Seedling.

SHORT OBOVATE.

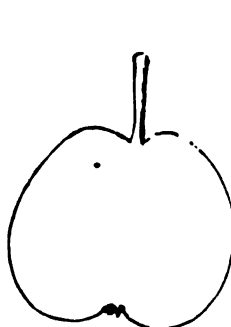


FIG. 642.—Bergamotte Cadette.

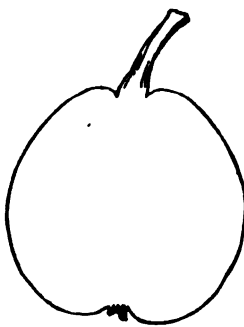


FIG. 643.—Sieulle.

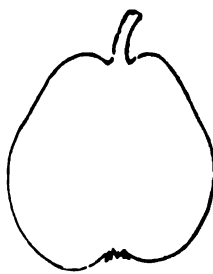
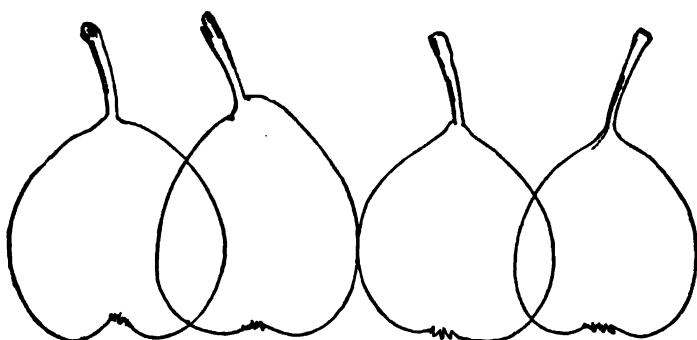


FIG. 644.—Gris d'Hiver.

OBOVATE-TURBINATE.—Bloodgood-shaped.

FIG. 645.
Bloodgood.FIG. 646.
Henry IV.FIG. 647.
Dundaa.FIG. 648.
Payency.

OBLATE.—Bergamot-shaped.

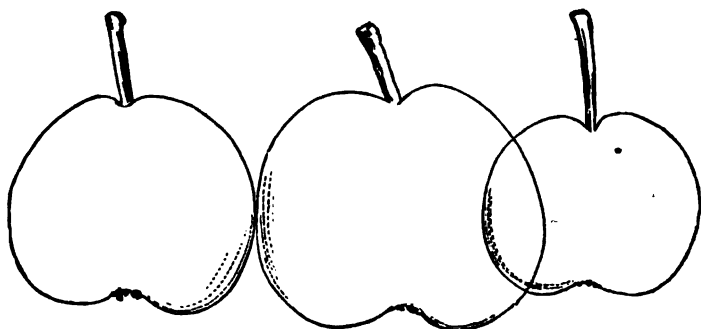


FIG. 649.—Beurré Goubalt.

FIG. 650.—Gansel's Bergamot.

FIG. 651.—Fulton.

The quality of pears is remarkably liable to change from external causes. A difference in soil and cultivation exerts so great an influence with many fine sorts, that while they possess the highest flavor when growing on favorable ground kept rich and mellow, they become greatly inferior or even worthless in poor soil with neglected culture. Besides these, there are other influences dependent on a change of locality, all of which taken together, have contributed to the great diversity of opinion which exists in relation to many celebrated varieties. The pomologist will hence perceive the difficulty of weighing evidence for and against the different sorts, and of expressing a degree of quality that shall coincide with the opinions of all.

It will be understood, that the quality given on the following pages refers only to pears tested in this country. Some European varieties, which maintain a high character at home, prove of no value here.

In describing pears, it may be well to repeat that the term *base* applies in all cases to the part nearest the tree; and *apex*, to the part most remote. This is in accordance with universal practice among eminent botanists. The apex is usually termed the *crown*; and it is sufficiently evident that the crown (upper portion or surmounting part) cannot at the same time be the base.

DIVISION I.—SUMMER PEARS.

CLASS I. DISTINCT PYRIFORM.

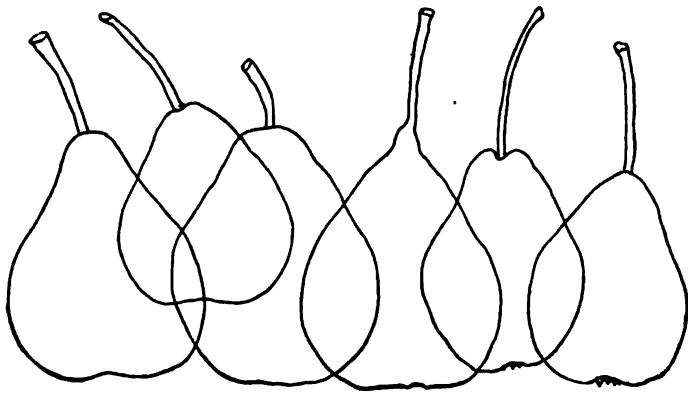
Bartlett.* (Williams' Bonchretien.) Quite large, obtuse-pyriform, somewhat pyramidal; surface wavy, clear yellow, sometimes a faint blush; stalk an inch and a fourth long, stout, slightly sunk; basin little or none; apex slightly plaited, sometimes smooth; flesh nearly white, fine-grained, exceedingly tender and buttery, with a nearly sweet, sometimes faintly sub-acid, fine, moderately rich flavor. Ripens end of summer and beginning of autumn, and far North, is strictly an autumn pear. The fruit, when not fully grown, ripens and becomes of good quality if kept in the house a week or two. Growth erect, vigorous, leaves folded, slightly recurved, shoots yellowish. Tree very productive, and bears very young. Although not of the first class as to flavor, the many fine qualities of this pear render it a general favorite. Fig. 610.

Brandywine.* Size medium; conic-pyriform (Tyson-shaped), neck acute; smooth, dull yellowish-green, partly russeted, crown thickly russeted; stalk three-fourths to an inch and a half long, fleshy at insertion; flesh white, very juicy and melting, of fine flavor. Leaves rather small, shoots pale olive, vigorous, upright; tree not very productive. Ripens in August. A native of Delaware County, Pa. Grows well on the quince. Fig. 623.

Clapp's Favorite.* Large, pyriform, body large tapering to the crown, neck rather small; skin smooth, yellowish-green becoming yellow, dotted and shaded with red to the sun; stalk rather short,

FIG. 652.—Madeleine.

FIG. 653.—Tyson.

FIG. 654.
Giffard.FIG. 655.
Pulsifer.FIG. 656.
Skinless.FIG. 657.
Rostiezer.

stout; calyx partly closed, basin small-wrinkled; flesh greenish or yellowish white, juicy, melting, perfumed, of very good quality. Ripens end of August and beginning of September, or about a week before the Bartlett. Young shoots dark purple, growth strong and vigorous, resembling that of the Flemish Beauty, with which and the Bartlett it is supposed to be a cross. New and promising. Dorchester, Mass.

Giffard.* Medium, pyriform, slightly Bosc-shaped, but shorter; skin greenish-yellow, marbled red on the sunny side; stalk rather long, calyx closed, basin small; flesh juicy, melting, slightly vinous, exceedingly agreeable. Middle of August. Shoots slender, reddish purple, growth straggling. Fig. 654.

Julienne. Size medium; slightly pyriform, approaching obovate, regular; whole surface clear yellow; stalk an inch long, rather stout; cavity small; calyx small, erect, or closed; basin rather shallow; flesh half buttery, sweet, of good flavor, but often poor on heavy soils. Late summer. Shoots yellowish. Productive, and bears when very young. Proves fine at the South.

Madeleine.* (Citron des Carmes, Magdalen, Green Chisel, *incorrectly*.) Medium in size, slightly pyriform, conic-obovate; skin smooth, pale yellowish-green, rarely a faint brownish blush; stalk slender, an inch and a half long; cavity very narrow and small; basin shallow; flesh juicy and melting, usually faintly acid, with an agreeable, delicate, fine, refreshing flavor. Matures about midsummer, or at the time of wheat harvest. Needs house-ripening. Shoots stright, erect, greenish, growth vigorous; tree rather liable to blight. Leaves quite flat. Fig. 652.

Pulsifer. Medium or rather small, pyriform, Madeleine or Rostiezer-shaped; skin dull yellow, sometimes slightly russeted; stalk short, curved, slightly sunk; basin shallow; flesh juicy, melting, and when well ripened of a very good flavor. Middle of August. Shoots greenish, rather erect. Illinois. Fig. 655.

Rostiezer.* Rather small, sometimes medium in size; conic-pyriform, approaching obovate, nearly Madeleine-shaped, regular; skin dull brownish green, with a dark, dull, reddish brown cheek to the sun, with whitish specks, and traces of thin russet; stalk an inch and a half to two inches long, slender, scarcely sunk; basin little or none; flesh juicy, melting, sweet, with a very high, perfumed flavor, of high excellence. Ripens late in summer. For rich flavor, it has scarcely an equal among summer pears. Shoots dark, large, leaves broad. Fig. 657.

Skinless. (Sanspeau.) Rather small, long pyriform, body conic-ovate, regular; skin smooth, very thin, yellowish green, often dotted with reddish brown in the sun; stalk about an inch and a half long, slender, curved, cavity very small; calyx closed or erect, basin minute, slightly ridged; flesh half melting, juicy, with a sweet, slightly perfumed, good flavor. Ripens immediately after the Madeleine, or two weeks after harvest. Growth very vigorous, erect, leaves flat, wavy. A profuse bearer; fruit always fair. Fig. 656.

Supreme de Quimper. Medium or small, conic-obovate; yellow, shaded with red; stalk short, obliquely set, not sunk; calyx partly open; basin shallow; juicy, melting, perfumed. First of August. Becomes dry if not picked early. Shoots dark purple, rather erect.

Tyson.* Size medium, conic-pyriform, sometimes approaching obovate; bright yellow, with a reddish-brown softly shaded cheek, often some russet; stalk an inch and a fourth long, inserted into a fleshy prominence abruptly contracted from the rounded neck; basin very shallow, even; flesh of fine texture, buttery, very melting, juicy; flavor nearly sweet, aromatic, slightly perfumed, excellent. Ripens the last two weeks of summer. Shoots quite dark brown, erect, vigorous. The tree does not come soon into bearing. Pennsylvania. Fig. 653.

Wilder.* Large, pyriform; pale yellow, shaded dark russet red; dots small, numerous; flesh pale yellow, fine-grained, tender, sub-acid, juicy. A Fox seedling. Very good.

CLASS II. OBSCURE PYRIFORM, OBOVATE OR TURBATE.

Bloodgood.* Size medium, turbinate, approaching obovate, base contracted abruptly to the stalk; yellow, touched with russet; stalk fleshy at insertion, an inch and a fourth long, set on the rounded base without depression; calyx scarcely sunk; flesh yellowish white, buttery, and melting, with a fine, rich, aromatic flavor. Sometimes rots at the core. On some soils the flavor becomes poor and insipid. Ripens middle of August. Like all

FIG. 658.—d'Été.

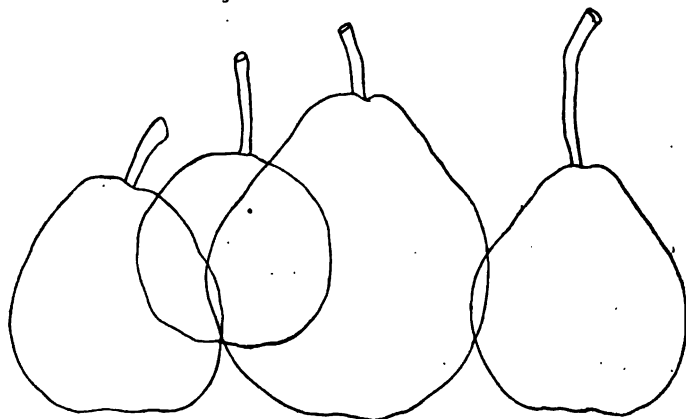


FIG. 651. Osband's Summer.

FIG. 660. Diel.

FIG. 661. Ott.

early pears, it is best if house-ripened. Origin, Long Island, N. Y. Fig. 645.

Dearborn's Seedling.* Scarcely medium in size, obovate or Buffum-shaped, regular, smooth; surface clear yellow, with minute specks; stalk an inch long, sunk little or none; basin very shallow; flesh very fine grained, juicy, melting, and of fine flavor. Ripens nearly with the Bloodgood, or middle of August. Shoots straight, long, dark brown. Tree bears when young. Fig. 641.

Edward's Henrietta. Size, a little below medium; obovate, crown flattened; stalk set on the rounded point of the neck; skin smooth, pale yellowish-green, dots few; stalk an inch and a half long, cavity small or none; calyx closed, basin shallow, faintly plaited; melting, juicy, sub-acid, with a good second-rate flavor. Very productive. Late summer. Origin, New Haven, Conn.

Limon. (Hagerston.) Size medium; obovate, sometimes slightly pyriform; light yellow, with a reddish-brown blush; stalk an inch and a half long; cavity round, even, shallow; calyx slightly sunk; flesh buttery, melting, of fine texture, with a mild, sweet flavor

slightly perfumed. Late summer. Shoots long, slender, reddish-brown. Belgian.

Manning's Elizabeth.* Small, obovate, Seckel-form, smooth; surface yellow, with a lively blush; stalk one inch long, cavity round, shallow; flesh very melting, saccharine, sprightly, perfumed, excellent. End of summer. Shoots diverging, dark reddish-brown, serratures of the leaves very slight. Belgian.

Moyamensing. Medium or large, sometimes quite large, variable; round-obovate, rather irregular; skin lemon yellow, sometimes marked with russet; stalk nearly an inch long, fleshy; basin furrowed; flesh buttery, melting, good, but not first-rate. Ripens from midsummer till autumn, quickly decays. Productive. Origin, Philadelphia.

Muscadine. Size medium; short obovate, regular, sometimes slightly oblique; surface a little rough, yellowish-green, thickly dotted; stalk an inch and a fourth long, rather stout; cavity very small, even; basin rather wide, shallow; flesh buttery, melting, a little coarse, rather rich, slightly musky, faintly astringent, moderately good. Late summer, and early in autumn. Shoots rather thick.

Osband's Summer.* (Summer Virgalieu, *erroneously*.) Medium in size, often rather small, obovate, regular, smooth and even (Doyenné-shaped); sometimes remotely pyriform; greenish-yellow becoming yellow, with a reddish-brown cheek, often faintly russeted; stalk three-fourths to one inch long, slightly sunk in a nearly even cavity; calyx erect, in a round, nearly even, or slightly wrinkled basin; flesh white, granular, with a sweet, mild, and fine flavor; soon loses its flavor when mature. Ripens early in August. Shoots yellowish-olive, thick. Origin, Wayne County, N. Y. Fig. 659.

Ott.* Small, roundish-obovate, or short Seckel-form; greenish-yellow, russeted in part, rarely a mottled red cheek; stalk an inch and a fourth long, cavity small; calyx rather large, basin shallow; flesh melting, rich, perfumed, aromatic, closely resembling that of its parent the Seckel. Ripens quite early, or by the first or middle of August. Shoots rather erect, brownish-green, leaves like Seckel. Origin, Montgomery County, Pa. Fig. 661.

Pinneo, or Boston. Size medium, obovate, slightly oblong, smooth; yellow when ripe, russeted around the stalk, which is long, straight, slightly sunk; basin moderate, wrinkled; flesh juicy, melting, pleasant, sweet, somewhat aromatic. Flesh dry, unless picked early. Late August. Shoots rather erect, light reddish-brown.

Summer Doyenné.* Small; round obovate, or short Buffum-shaped; stalk an inch or an inch and a fourth long, rather stout, slightly oblique, not sunk; basin very shallow; skin a fine yellow, with a warm cheek brightly reddened at the crown, and with radiating stripes of greenish-yellow from the calyx; flesh melting, juicy, sweet, with a pleasant, very good flavor. Skin thin; core small; seeds small, white. Ripens latter part of July. Tree bears very young. Shoots slender, reddish-brown.

CLASS III. ROUNDISH OR OBLATE.

Duchesse de Berry d'Été. Small, roundish, sometimes oblate, occasionally approaching obovate; yellow, sometimes shaded light red; stalk short, slightly sunk, basin shallow; juicy and melting, flavor "very good." End of August. Shoots stout, light greenish.

Muskingum. Medium, roundish; greenish-yellow, thickly dotted; stalk long, cavity small; basin shallow; flesh melting, pleasant, perfumed. End of August.

Reliance.* Medium, oblate, brownish-red, russeted; flesh fine-grained, melting, juicy, good. A Van Mons' seedling. Tree vigorous, prolific.

Summer Portugal. (Passans du Portugal.) Size rather small, often nearly medium, roundish-oblate, regular; skin yellowish-green or pale yellow, with a handsome red cheek in the sun, formed of the reddened dots; stalk about an inch long; calyx stiff, erect; cavity and basin shallow; flesh white, breaking, tender, juicy, moderately good. Late summer. Very productive. Shoots upright, reddish-brown.

DIVISION II.—AUTUMN PEARS.

CLASS I. DISTINCT PYRIFORM.

Adams. Large, pyriform; deep yellow, smooth, shaded red next the sun; stalk short, stout, wrinkled at base; scarcely sunk, eye small, closed, even with the crown; flesh white, fine, melting, rich, vinous, perfumed. September and October. Shoots dark brown, tree upright. Massachusetts.

Alpha. Size medium, pyriform, obovate or Madeleine-shaped, smooth; pale yellowish-green, with a faint brown blush; stalk slightly sunk, basin moderate; fine-grained, buttery, and good. October. Belgian. Fig. 634.

Ananas d'Été. Rather large, obtuse-pyriform; skin smooth, clear yellow, with numerous small dots, often with a blush; stalk stout and fleshy; basin small; flesh fine-grained, buttery, and melting, sweet and very good. Early autumn. Growth somewhat irregular, shoots brownish-purple.

Andrews. (Amory, Gibson.) Medium or rather large, distinct pyriform, often slightly one-sided; skin thick, dull yellowish-green, with a broad, dull red cheek; stalk about an inch long, curved, scarcely sunk; basin shallow, sometimes deep; flesh greenish, very juicy, melting, of a fine, pleasant, agreeable flavor. On some localities not first-rate. Ripens early in autumn. Very productive and fair. Shoots diverging. Origin, Dorchester, Mass.

Angouleme.* Very large, very obtuse-pyriform, sometimes oblong-obovate, surface uneven; greenish-yellow, often some russet; stalk an inch to an inch and a half long, very stout; cavity deep, often wide; calyx small, basin uneven; flesh yellowish-white,

melting, buttery, juicy, very good when well grown, poor or worthless when small; succeeds admirably and is best on quince stock. It has been remarked that when this pear weighs less than four ounces it is worthless in flavor. Ripens mid-autumn and later. French. Fig. 663.

Autumn Paradise.* (Paradise d'Automne.) Rather large, distinct pyriform; surface uneven, yellowish-orange, with some thin russet patches; stalk an inch and a half long, not sunk; basin small, irregular; flesh melting, very buttery, with a rich, high, and ex-

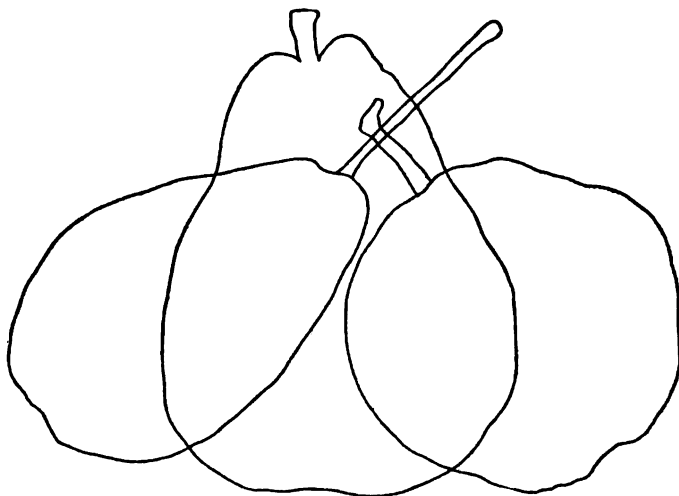


FIG. 662.—Jargonelle. FIG. 663.—Angouleme. FIG. 664.—Garber.

cellent flavor. Ripens about mid-autumn. Shoots yellowish, at first upright, afterward becoming straggling, growth vigorous. This pear resembles the Bosc, but is less smooth, more irregular in form, has a less narrow neck, and more vigorous growth. Shoots yellowish-brown, speckled, irregular, leaves finely serrated, slightly wavy.

Bachelier. Rather large, obovate, pyriform, irregular; green; stalk rather short, obliquely set; calyx partly closed, basin shallow; buttery, melting, vinous, aromatic, flavor moderate. November, December. Shoots reddish-yellow, vigorous. Large, well-grown specimens are sometimes nearly Bartlett-shaped, small ones approach roundish-obovate. Bark of the tree cracks.

Barry.* Medium, pyriform, irregular; yellow, rough, spotted red on sunny side; stalk short, obliquely set; calyx small, basin narrow; rather coarse, juicy, rich, perfumed. An excellent fruit. October.

Baronne de Mello. (Adele de St. Denis.) Medium, conic-pyriform (often Tyson-shaped), sometimes obovate or turbinate, variable;

skin rough, much russeted; stalk fleshy at insertion; flesh rather coarse, very juicy and melting, vinous or sub-acid, of moderate quality. October. Tree vigorous, a great bearer.

Bergen Pear. Large, pyriform, sometimes approaching obovate or turbinate, smooth; yellow, with a handsome cheek; stalk curved, slightly sunk; calyx and basin small; fine-grained, buttery, melting, sweet, excellent. Last of September. Long Island.

Bosc.* (Calebasse Bosc.) Large, very distinct pyriform, neck rather long and very narrow, acute, body broad; surface nearly smooth, deep yellow, russeted in patches; stalk an inch and a half long, slender, curved; basin very shallow; flesh juicy, buttery, rich, perceptibly perfumed, sweet, excellent. Mid-autumn. Growth moderate, a regular, even bearer. Fails on quince stocks. Belgian. Fig. 615.

Canandaigua. Rather large, pyriform, somewhat irregular (Bartlett-shaped); lemon yellow; stalk rather short, oblique; basin small; flesh buttery, melting, rather rich. September. Shoots strong, erect, light purplish-red.

Capiaumont. (Beurré de Capiaumont.) Size medium, conic-pyriform, or Tyson-shaped, quite acute, approaching turbinate, regular; skin smooth, yellow, with cinnamon red to the sun, distinctly dotted, slightly russeted; calyx widely reflexed, not sunk; stalk about an inch long, but varying; flesh white, buttery, melting, moderately juicy, sweet, often astringent, about second quality. Hardy and productive. Leaves folded, recurved. Ripens about mid-autumn. Belgian.

Comice.* Large, roundish-pyriform, somewhat pyramidal; greenish-yellow, becoming fine yellow at maturity, often with a faint crimson blush, slightly russeted, thickly dotted; stalk short, stout, set obliquely in a small cavity; calyx small, in a deep, uneven basin; flesh white, fine, melting, with a sweet, rich, slightly aromatic flavor. Keeps long after fully ripe. October and November. Young wood apt to be injured. Fig. 666.

Comte de Paris. Size medium, pyriform, approaching obovate, regular; skin thick, somewhat rough, bright green, becoming yellow at maturity; flesh nearly white, buttery, melting, juicy, with a agreeable perfume. Ripens in October, and continues in use a long time. One of Van Mons' seedlings. The tree is vigorous, with a stout erect growth, and appears to succeed well on the quince.

Chancellor. Large, obtuse pyriform, large specimens early Bartlett-shaped, small ones obovate; green; stalk an inch long, rather thick; cavity small, irregular; calyx small, basin contracted; flesh melting, rich, agreeable. Mid-autumn. Germantown, Pa.

Comte de Flandre. Rather large, pyramidal-pyriform, often oblique; skin yellow, with small dots and thin russet; stalk long, set under a lip, with a little depression; basin shallow; flesh juicy, melting, with an agreeable, refreshing flavor, very good. November.

Conseiller de la Cour. (Maréchal de la Cour.) Large, pyriform

(somewhat Bosc form); greenish-yellow, slightly russeted; stalk slender, not sunk; basin small, calyx small, nearly closed; flesh white, melting, sub-acid, juicy, of fine quality. Late autumn and early winter. Tree vigorous, productive. Succeeds on quince. Foreign. Fig. 617.

Countess of Lunay. Size medium, obovate-pyriform, somewhat conic; skin smooth, pale waxen yellow, with a thin red cheek; stalk about an inch and a half long, set without depression on the rounded point of the neck, which is slightly russeted; basin very

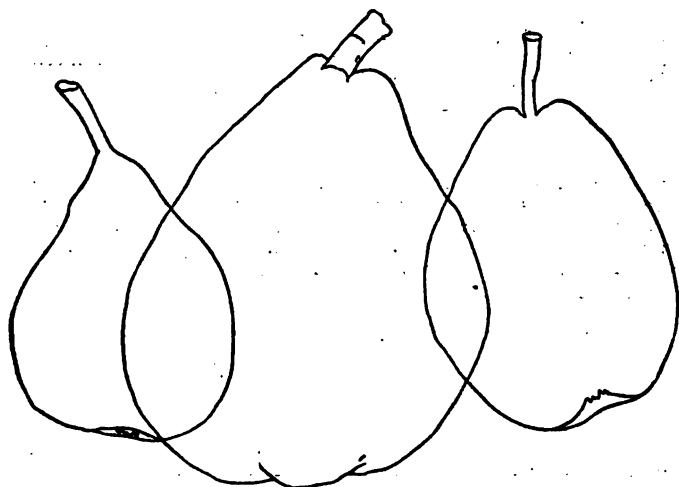


FIG. 665.—Nantais.

FIG. 666.—Comice.

FIG. 667.—Dix.

small, even; flesh white, very juicy, melting, fine, very good. Mid-autumn.

De Tongres. (Durandau.) Large, pyramidal-pyriform, surface uneven or knobby; yellow, with bronze russet and red stripes; juicy, melting, rich, sub-acid, perfumed. October, November. A large, handsome, and excellent pear, but the tree is rather tender. Shoots light brown, slender, spreading, leaves narrow.

Diel.* (Diel's Butter.) Large, sometimes very large, thick pyriform, neck short, obtuse, body very large; small specimens approach obovate; skin dull yellow, with numerous conspicuous dots, and some russet; stalk an inch and a fourth to an inch and a half long, stout, moderately sunk; basin slightly furrowed; flesh rather coarse, rich, sugary, buttery, juicy, fine. Late autumn and early winter. Shoots large, spreading, irregular; leaves roundish or broad. Succeeds well on quince stocks. Belgian. Fig. 660.

Dix.* Large, long pyriform, body round-ovate, tapering slightly

to the often oblique and slightly flattened and obtuse crown; yellowish green, becoming deep yellow; dots numerous, distinct; stalk an inch and a quarter long, stout at each end, slightly sunk; basin small; flesh rather granular, rich, juicy, sweet, often excellent, sometimes rather acid. The fruit often cracks. Middle and late autumn. A tardy bearer. Shoots yellow, rather slender, often thorny; leaves flat. A native of Boston, Mass. Fig. 667.

Duc de Brabant. (Waterloo, Meil de Waterloo, Fondante de Charneuse, Beurré Charneuse, Belle Excellente, Excellentissima.) Large, roundish-pyriform, tapering to crown (somewhat Ononidga-shaped), neck small; greenish, dotted green, shaded crimson on the sunnyside; stalk long, curved, scarcely sunk; basin irregular, ribbed; flesh greenish white, buttery, and melting, with a refreshing vinous flavor. October, November.

Duchesse d'Orleans. Large, often only medium, sometimes long pyriform, but usually obovate-pyriform, somewhat pyramidal; skin golden yellow, slightly russeted, sometimes nearly overspread with russet, with a red cheek; stalk thick, about an inch and a half long, scarcely sunk; basin small, even; flesh buttery and melting, rich; when well ripened, delicious. Ripens mid-autumn. A handsome, fine, French variety. Growth rather spreading, shoots yellowish green.

Duval. Medium, obtuse pyriform or Bartlett-shaped; pale green; buttery, melting, with good flavor. October, November. Productive. Fig. 611.

Dumas. (Belle Épine Dumas, Duc de Bordeaux.) Medium, long pyriform; greenish-yellow; stalk long, scarcely sunk; basin shallow, regular; calyx partly closed; buttery, half melting, sweet, flavor peculiar. Late autumn. Growth vigorous, succeeds on quince. Shoots dark, speckled; leaves narrow.

Emile d'Heyst. Large, long pyriform (like the Winkfield); light green with some brown russet; stem variable, rather long, sometimes fleshy; calyx small, basin narrow, deep, and knobby; buttery and melting, fine, perfumed. November. Shoots long, brownish-yellow, diverging and straggling. Fig. 612.

Figure. Medium or rather large, pyriform-pyramidal, regular, body rounding to the apex; skin thin, green, partly russeted at crown, often a dull red cheek; stalk an inch long, stout, very fleshy at insertion, not sunk; basin none; flesh rather coarse, melting, juicy, rich, high flavored. Late autumn.

Figure d'Alencon. Large, irregularly pyramidal or pyriform; green, spotted with russet; flesh melting, juicy, vinous, sprightly, excellent. October to December. Tree vigorous, productive. Shoots reddish-purple, leaves thick.

Forelle.* (Trout Pear.) Medium or rather large, pyriform, approaching oblong-obovate; green, becoming clear yellow, with a deep vermilion cheek, dots margined with crimson; stalk an inch long, slender; cavity moderate; basin rather abrupt and narrow; flesh buttery and melting, but not rich. Late autumn. Shoots

dark, purplish; leaves small, nearly flat. German. A pear of great beauty, which has contributed to its reputation.

Graslin. Large, pyramidal-pyriform, often tapering to the crown; skin thick, green, slightly russeted; stalk long, slightly sunk; basin furrowed, flesh coarse, buttery, melting, rich, vinous. October, November.

Harvard. Medium or rather large, oblong-pyriform; skin russety olive-yellow, and with a reddish cheek; stalk rather stout, sunk little or none, oblique; basin narrow; flesh juicy, melting, tender; rots at the core if not house-ripened. First of autumn. Very pro-

FIG. 668.—Marie Louise.

FIG. 669.—Comte de Flandre.

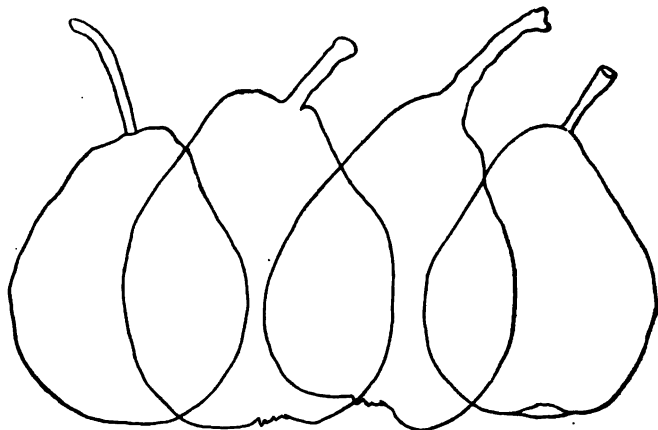


FIG. 670.—Swan's Orange. FIG. 671.—Louis Bonne.

ductive, growth vigorous, fruit handsome, rendering it profitable for market, although only second-rate in quality. Origin, Cambridge, Mass.

Kennes. Medium, pyriform, somewhat Urbaniste-shaped; greenish-yellow, russeted; stalk thick, fleshy at insertion; calyx partly closed; basin broad, shallow; buttery, melting, sweet, rich, perfumed. Excellent. October. Must be house-ripened. Fig. 631.

Lodge. Medium, pyriform, neck small, narrow, very acute, sometimes ribbed and irregular; greenish-brown, much russeted; stalk long, rather stout, curved; basin varying from shallow to deep; flesh juicy, melting, with a rich, vinous, sub-acid, Brown Beurré flavor. Early and mid-autumn. Philadelphia, where it proves very good, but farther North does not stand so high. Shoots slender, yellowish-brown, erect, and diverging.

Long Green. (Verte Longue.) Rather large, long-pyriform, the ends rather acute, stem oblique; surface wholly green; flesh very juicy, with a good and agreeable flavor. The Striped Long Green is a sub-variety.

The Long Green of Autumn (*Verte Longue d'Automne*, or *Mouth-water*) is quite distinct, being smaller, much more rounded, stem long, and with a brown cheek; very juicy and pleasant; ripens late in autumn, a month after the preceding. Profusely productive, and valuable.

Louis Bonne.* (*Louise Bonne de Jersey*, *Louise Bonne d'Avranches*.) Large, pyriform, tapering slightly to obtuse or flattened crown; slightly one-sided; surface smooth, pale yellowish-green, with a brownish red cheek; stalk an inch to an inch and a half long, often fleshy at insertion, little sunk; basin shallow; flesh yellowish-white, very juicy, buttery, melting, rich, faintly subacid, fine. Ripens mid-autumn; late autumn far North, early autumn at Cincinnati. Very productive; succeeds admirably and grows with great vigor on quince stocks. Shoots dark brown or purple; serratures of the leaves rather coarse. This fine variety, like the Bartlett, is hardly of the highest quality, but is eminently valuable for its large, fair fruit, free upright growth, and great productiveness. Fig. 671.

Madame Eliza. Large, pyriform, approaching pyramidal; skin green, becoming nearly yellow; flesh buttery, melting, sweet, perfumed, agreeable. November. Shoots greenish-brown, erect. Belgian.

Marie Louise. Large pyriform, a little one-sided, or with a curved axis; body somewhat conical; surface pale green, becoming yellowish, partly russeted; stalk an inch and a half long, rather stout, often oblique; calyx small, basin narrow, plaited; flesh buttery, melting, vinous, when well grown rich and fine—often second or third rate—variable. Needs rich cultivation or else the fruit will be poor. Mid-autumn. Growth very flexuous and straggling; shoots olive-gray, petioles very long, leaves narrow. Belgian. Fig. 668.

Millot de Nancy. Medium or below, distinct pyriform; orange russet on dull yellow; stalk an inch long, not sunk; flesh buttery and melting, moderately juicy, and rich, sweet, aromatic. October, November. Belgian.

Moire. Rather large, pyriform, approaching obovate; greenish-yellow; stalk stout, curved, cavity uneven, basin shallow; flesh yellowish, slightly granular, buttery, melting, rich, variable, often very good. October. Shoots purple, leaves wavy.

Nantais. (*Beurré de Nantes*.) Large, long pyriform or pyramidal; greenish-yellow, with a red cheek; stalk large, set under a lip, not sunk; calyx large, in a broad, furrowed basin; juicy, perfumed, very good. October. Fig. 665.

Napoleon.* Medium or rather large; conic-pyriform, obtuse, variable; green becoming pale yellowish-green; stalk an inch long, stout, slightly sunk; basin rather large; flesh uncommonly juicy, melting, moderately rich, good, often astringent and worthless. From mid-autumn till winter. Needs ripening in a warm room. Very productive, thrifty, hardy. Shoots rather erect. Belgian. Best on warm, light soils.

Nouveau Poiteau.* Medium or large, conic-pyriform, sometimes approaching obovate, greenish, much russeted, and thickly dotted; stalk rather short, often fleshy at insertion, not sunk; calyx closed, basin moderate; flesh buttery, melting, somewhat vinous, very good when well grown. November. A strong grower, shoots brownish red, and forms a handsome pyramid on quince. Belgian.

Onondaga.* (Swan's Orange.) Quite large, obtuse oval-pyriform, nearly in the form of a double cone, neck very short and obtuse, body large and tapering to obtuse apex; skin roughish, greenish-yellow, becoming rich yellow, dots numerous, often a slight brown cheek, crown often slightly russeted; stalk an inch to an inch and

FIG. 672.—Ontario.

FIG. 673.—Van Mons.

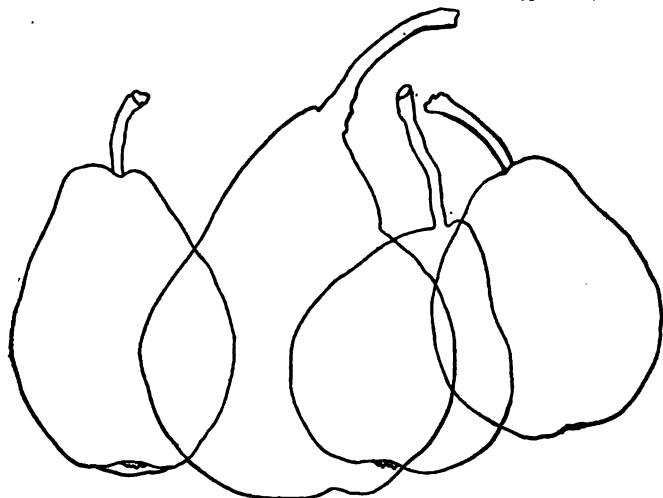


FIG. 674.—Seneca. FIG. 675.—Worden's Seckel.

a half long, stout, slightly sunk; calyx small, closed, basin narrow, ribbed; flesh slightly coarse, buttery, melting, sometimes a little breaking, juicy, rich, fine, but not of the highest quality, sometimes astringent. Ripens midautumn. Growth vigorous, shoots yellow, ascending. Productive. Figs. 621 and 670.

Ontario. Medium or rather large, oblong-pyriform (somewhat Bartlett-shaped, but more obovate), sometimes faintly ribbed, somewhat irregular; pale yellow, thickly dotted; stalk an inch long; cavity small, irregular; calyx open or partly closed; basin wrinkled; flesh buttery, melting, with a mild, pleasant, agreeable flavor. First of October. Shoots yellowish-red, rather erect. Geneva, N. Y. Fig. 672.

Parsonage. Medium or large, pyramidal-pyriform, approaching conic-obovate; skin orange yellow, partly russeted, thickly dotted;

stalk short, thick; cavity small; calyx partly open, basin shallow; flesh granular, melting, juicy, rich. September. New Rochelle. N. Y.

Payency. (Paquency.) Size medium; pyriform approaching obovate-conic (Tyson-shaped); skin dull yellow, slightly russeted, with a faint dull blush; stalk an inch long, stout; calyx erect, basin shallow; flesh white, juicy, melting, good. Mid-autumn. French. Fig. 644.

Pratt.* Medium or rather large, obovate-pyriform; skin greenish-yellow, thickly dotted; stalk an inch long, slender and moderately sunk; basin wide, shallow; flesh tender, melting, juicy, excellent. Early autumn. Shoots yellowish, erect, leaves rather narrow, recurved. Rhode Island. Fig. 629.

Queen of the Low Countries. Large pyriform, neck narrow, body broad or slightly oblate (Bosc-shaped); surface slightly uneven, dull greenish-yellow, crown russeted, with numerous, often confluent russet dots, and a slight blush; stalk an inch and a half long, curved, not sunk; calyx small, rather deep-set, basin ribbed; buttery, melting, juicy, moderately rich, sub-acid, with a second-rate, Brown Beurré flavor. Mid-autumn. Belgian.

St. Ghislain.* Size medium, pyriform, neck narrow, acute, tapering; surface pale yellow, sometimes a faint blush; stalk an inch and a half long, curved with fleshy rings at insertion; basin very shallow; flesh white, buttery, juicy, with a fine flavor. Growth upright, vigorous, shoots light brown. Somewhat variable in quality. Belgian. Early autumn. Requires high cultivation. Fig. 627.

St. Michel Archange.* (Plombgastel.) Rather large, pyramidal-pyriform, greenish yellow, thickly dotted, partly russeted; stalk medium length, stout, fleshy at insertion, not sunk; calyx closed, basin small, uneven; flesh rather coarse, juicy, rich, aromatic. October. Shoots greenish, quite erect, leaves narrow, light green. Tardy bearer.

Selleck. Large, obtuse-pyriform (Diel-shaped), ribbed; fine yellow, thickly dotted; stalk long, curved, fleshy at insertion; cavity moderate, calyx closed; basin small, uneven; flesh white, juicy, melting, rich, aromatic, excellent. September, October. Shoots slender, brownish-yellow.

Seneca.* Large, obovate-pyriform; stem nearly two inches long, flattened at junction, with fleshy ridge; basin large, irregular, light yellow, bright green mottlings, black dots, blush on side; flesh white, fine-grained, melting, vinous, sprightly. Very good. September. Fig. 673.

Soldat Laboureur. Rather large, pyriform; skin becoming yellow when ripe, slightly russeted; stalk rather stout, curved, slightly sunk; cavity small, abrupt; basin small; flesh granular, melting, juicy, and when well grown of a rich, vinous flavor; variable, often poor. Late autumn. Shoots erect, light greenish-brown. Belgian.

Soulange. Rather large, acute or conic, pyriform, or with neck

tapering into stalk, which is stout, curved, and fleshy; pale yellow, with traces of russet; basin and calyx rather large; melting, very juicy, rich, aromatic. September, October.

Souvenir d'Esperen. Large, pyriform, obovate, tapering to crown, dull yellow, with a mottled red cheek; melting, vinous. Shoots yellow, erect. November. Belgian.

Sterkmans. (Doyenné Sterkmans.) Size medium, short pyriform, broad at the crown, slightly ribbed; skin greenish-yellow, dotted and shaded red to the sun; stalk an inch or more long; cavity small, uneven; basin rather large, uneven; flesh fine-grained, buttery, and melting, with a very good, slightly vinous flavor. Late autumn.

Theodore Van Mons. Rather large, obovate-pyriform, sometimes long pyriform; greenish yellow, somewhat russeted; stalk an inch long, scarcely sunk; calyx large, open; flesh granular, juicy, melting, varying from good to very good. September, October. Tree vigorous and productive on pear or quince. Fig. 673.

Triomphe de Jodoigne. Quite large, obtuse-pyriform, irregular and uneven; skin rough, thick, greenish-yellow, with russet dots; stalk large; calyx partly closed in a small basin; flesh coarse, juicy, buttery, musky, of moderate quality. Late autumn, keeps into winter. Growth vigorous, spreading, irregular.

Urbaniste.* (Beurré Piquery.) Medium or rather large, conic-pyriform, obtuse and short, often approaching obovate; skin pale yellow or greenish, faintly russeted; stalk an inch long, stout, moderately and sometimes considerably sunk; calyx erect or closed; basin distinct, even; flesh melting, buttery, with a fine, delicious flavor, and a perceptible shade of acid. In unfavorable localities, it is sometimes of moderate quality. Middle and late autumn. Does not come soon into bearing. Shoots slender, greenish-yellow, leaves narrow, recurved. Flemish. Fig. 628.

Van Mons' Leon Le Clerc. Large, long pyriform, obtuse; surface yellowish-green, slightly russeted; stalk an inch and a fourth long, stout, little sunk; calyx small, basin very shallow; flesh fine grained, yellowish-white, buttery, melting, rich, fine. Ripens middle and late autumn. A native of Laval, in France. The value of this fine pear is nearly destroyed by its liability to crack and canker.

Verte Longue of Angers. Large, distinct pyriform (nearly Bosc-shaped); green; stalk rather short, oblique, not sunk; basin rather small; flesh greenish-white, juicy and melting, agreeably perfumed. October. Belgian. Resembles Long Green (or *Verte Longue*). Fig. 614.

Wilmington. Medium, pyriform, approaching obovate; cinnamon russet on yellow ground; cavity slight, often none; basin rather large; flesh fine, melting, buttery, rich, aromatic. September. Philadelphia. Fig. 625.

Worden's Seckel.* Medium, conic-pyriform; golden yellow, one side bright crimson; stem one and one-quarter inches long, not curved, slight fold at base; basin shallow; flesh dull white, very

juicy, buttery, fine-grained, melting, promising. Autumn. New York. Fig. 675.

CLASS II. OBSCURE PYRIFORM, OBOVATE, OR TURBINATE.

Abbott. Medium in size, oblong-obovate (like the Washington); surface even, smooth, dark dull green, with a reddish-brown cheek changing to scarlet; stalk an inch long; calyx small, closed; melting, juicy, rich. Early mid-autumn. Good and handsome, shoot purplish. Providence, R. I.

Amalis. (Beurré d'Amanlis.) Large, obovate, often irregular, sometimes slightly pyriform, with a short and narrow neck; dull yellowish-green, with some russet, and a dull reddish cheek; stalk an inch and a quarter long, very slightly sunk; basin shallow; flesh buttery, melting, and juicy, and rather rich, with a moderate, often astringent and poor flavor. Early and mid-autumn. A strong grower, great bearer, tree spreading, irregular; leaves sharp serrate.

Anjou.* Rather large, obtuse Doyenné-form, regular; surface greenish-yellow, a dull red cheek to the sun, clouded with russet; stalk quite short, or half an inch long, lightly sunk; cavity uneven, basin shallow, round, smooth; flesh yellowish-white, fine-grained, buttery, melting, with a high, rich, vinous, excellent flavor. Shoots light green, leaves recurved, wavy. Begins to ripen in the middle of autumn, and keeps long, sometimes into midwinter. The hardness, uniformity, reliability, excellence, and long-keeping qualities of the Anjou render it one of the most valuable of all pears. French. Fig. 678.

Augustus Dana. Medium or large, obovate; skin dull green, slightly rough, partly russeted, thickly dotted; stalk long, curved, scarcely sunk on the obtuse end; eye large, slightly sunk; flesh juicy, melting, rich, aromatic. October and November. Growth irregular, thorny, like Dix. Massachusetts. New.

Auguste Royer. Medium, turbinate; skin russet-fawn, becoming orange; juicy, rich, perfumed. November. Vigorous and productive.

Belle Lucrative.* (Fondante d'Automne.) Size medium, conic-obovate, sometimes remotely pyriform; surface pale yellowish-green, slightly russeted; stalk and inch and a quarter long, often fleshy, oblique; cavity very small and narrow; calyx short; basin smooth, sometimes furrowed; flesh very juicy, with a fine texture, melting, rich, excellent. Variable—when well grown and fully ripened, it has no superior and few equals, in its exceedingly rich, delicate, perfumed flavor—but sometimes of poor quality. Middle or last of September. Belgian. Growth moderate, upright, shoots yellowish-gray. Fig. 676.

Bergamotte Cadette. (Beauchamps, Beurré Beauchamps, Poire de Cadet.) Size medium, round-obovate, or round-oval; surface greenish-yellow, often russeted, frequently tinged with reddish-brown to the sun; stalk an inch and a fourth long, scarcely sunk

on the rounded base; calyx erect or closed, basin very shallow; flesh melting, buttery, juicy, sweet, quite rich, slightly perfumed. Late autumn. Shoots greenish, slender, erect, and diverging; leaves small. Productive. French. Fig. 642.

Berkmans. Medium, turbinate, or short pyriform; yellowish, rough, russeted; stalk fleshy, oblique, basin shallow, furrowed; buttery and melting, rich, and perfumed. November, December.

B. S. Fox.* Large, obtuse obovate, russet yellow; flesh fine-grained, very juicy, vinous. A Fox seedling from California. Very good.

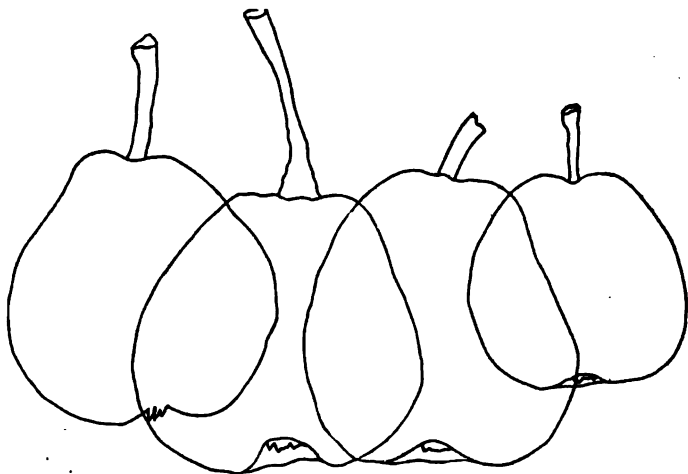


FIG. 676.
Belle Lucrative.

FIG. 677.
Edmonds.

FIG. 678.
Anjou.

FIG. 679.
Buffum.

Navey. Rather large, roundish obovate, obscurely pyriform; yellow, with some russet; stalk large, often fleshy, cavity slight; basin moderate; flesh buttery and melting, rich, sub-acid, aromatic, perfumed, very good. October, November.

Beymont. (Beurré Bieumont.) Size medium, obovate (Bloodgood-shaped); crimson russet; stalk long, curved, calyx small, basin shallow; melting, very sweet, rich, perfumed. October to December.

Bon Chretien Fondante, or "Melting Bonchretien." Size medium, roundish, slightly oblong, rarely short obovate, obtuse; surface dull green, partly russeted, numerous dotted; stalk an inch long, moderately or slightly sunk; basin small; flesh yellowish-white, or yellow and rather gritty, melting, very juicy, rich, pleasant, somewhat variable. Ripens about mid-autumn or later. Hardy, vigorous. Leaves conspicuously folded and recurved.

Boussock.* (Doyenné Boussock, Doyenné Boussock Nouvelle.)

Large, thick obovate, sometimes slightly pyriform, slightly uneven; surface bright lemon yellow when ripe, partly russeted, sometimes a slight reddish cheek; stalk stout, about an inch long, varying, sometimes fleshy, often oblique; basin very shallow, even; flesh buttery, melting, very juicy, with a very good flavor. Ripens middle of September. Shoots diverging, purplish. A valuable and reliable pear; requires early picking. Fig. 636.

Brown Beurre. (Beurré Gris, Grey Beurré, Beurré Rouge, Red Beurré, Beurré Isambert.) Large, often only medium, oblong-obovate, with a rounded taper to the stalk; skin yellowish-green, russeted; stalk an inch to an inch and a half long, rather oblique, thickening into the fruit; basin rather shallow; flesh greenish-white, very juicy, melting, buttery, with a rich acid or vinous flavor. Early mid-autumn. Variable in quality.

Buffum.* Size medium, obovate; skin yellow, with a broad, reddish-brown cheek, somewhat russeted; stalk three-fourths of an inch long, stout; cavity and basin moderate or small; flesh buttery, sweet, very good, slightly variable. Shoots strong, reddish-brown, very erect; tree very productive. Valuable for its fair fruit, and fine bearing qualities. Ripens end of September, but should be picked two weeks before, or it becomes mealy. Origin, Rhode Island. Fig. 679.

Cabot. Size medium, round-obovate, slightly irregular, crown full, obtuse; stalk an inch long, set on the pointed base without depression; surface rough, russeted, bronze yellow; basin round, smooth; flesh greenish-white, breaking, somewhat melting, juicy, sub-acid, good. Early mid-autumn. Tree vigorous, very productive. Hardy, reliable. Origin, Salem, Mass.

Capeheaf. Rather small, short obovate, wide at crown, somewhat conic, or with a rounded taper to the stalk; surface deep yellow, mostly russeted; stalk an inch long, stout, slightly sunk; calyx small, basin rather large; flesh melting, juicy, buttery, mild, sweet, good, of second quality. Ripens mid-autumn. Shoots erect, stout, yellowish-brown; very productive. Rhode Island.

Collins. Size medium, obovate, approaching turbinate; greenish-yellow; stalk short, thick, oblique, not sunk; calyx small, scarcely sunk; flesh juicy and melting; of medium quality. First of October. Massachusetts.

Comte de Lamy. Rather small, roundish-obovate (Bloodgood-shaped); yellow, with dots and thin russet; stalk an inch long, set under a lip, scarcely sunk; basin shallow; juicy, melting, refreshing, agreeable. October. Shoots reddish, erect.

Cushing. Medium or rather large, obovate, or Doyenné form; surface light greenish-yellow, rarely a dull red cheek; stalk an inch long, cavity abrupt; basin rather shallow; flesh fine-grained, buttery, melting, with a fine flavor, nearly first-rate. Ripens in the early part of autumn. Shoots spreading. Very productive. Origin, Hingham, Mass. Fig. 637.

Dallas. Size medium, obovate, slightly conic-pyriform; dull yellow, often much russeted; stalk an inch long, not sunk; basin

round, slightly wrinkled; segments of the calyx rounded, stiff; flesh fine-grained, melting, juicy, good. Ripens late autumn. Connecticut.

Delices d'Hardenpont of Angers. Medium, obovate-turbinate, sometimes conic, approaching pyriform; greenish-yellow, with some russet; stalk short, thick, fleshy at insertion; cavity little or none; calyx and basin small; flesh slightly coarse, juicy, rich, perfumed. October, November.

Defais. Size medium, obovate, or short Doyenné form, sometimes obscurely pyriform; waxen yellow, with a bright red cheek; stalk curved, cavity broad and deep; calyx large, basin broad and deep; buttery and melting, sweet, rich, perfumed. October, November. Fig. 638.

Dillen. Large, oblong-pyramidal, pyriform; fine yellow, russeted, dotted; stalk short, thick, fleshy; calyx rarely open; basin moderate; flesh juicy, buttery, sweet, and rich. November, keeping into December.

Downing. Medium, roundish-ovate; green, becoming yellow, thickly dotted; stalk short, obliquely set; basin small; flesh a little coarse, juicy, melting, rich, vinous. September.

Duchesse Helene d'Orleans. Large, obovate, somewhat pyriform, oblique; green, becoming yellow, slightly russeted, rough; stalk short, under a lip; basin narrow; buttery, melting, rich, vinous, slightly astringent. October, November. Belgian. New.

Dumortier. Medium, roundish obovate; dull yellow, somewhat russeted; stalk long, slender, not sunk; calyx and basin small; flesh greenish-white, juicy, melting, rich, aromatic, perfumed. September.—quickly decays. Belgian.

Dundas. Size medium, short turbinate, sometimes obovate, base flattened; skin yellow, with a brilliant blush; stalk an inch long, stout, not sunk; calyx small, basin wide, deep, and even; flesh half buttery, tender, melting, rich, perfumed. Mid-autumn. A handsome Belgian variety. Fig. 647.

Dunmore. Large, oblong-obovate; surface greenish, with dots of brownish-red russet; stalk an inch and a half long, stout, fleshy at insertion, scarcely sunk in the obtuse and rounded base; calyx small, deep set; flesh buttery, melting, rich, often acid, sometimes astringent. Early autumn. English.

Edmonds. Medium to large, obovate; surface irregular; stalk long, stout and fleshy toward the base, set in a moderate, knobby cavity; basin ribbed or uneven; flesh yellowish-white, very fine-grained, melting, with a sweet, peculiar, excellent flavor. September. Shoots very stout, greenish-brown; leaves thick, folded, recurved. Rochester, N. Y. Introduced by Ellwanger & Barry. New. Fig. 677.

Figure de Naples. (Fig Pear of Naples.) Medium, or rather large, oblong-obovate, sometimes slightly obovate-pyriform, base very obtuse; surface yellowish-brown, with a faint reddish cheek; stalk an inch long, fleshy at insertion; basin broad, shallow, smooth;

flesh buttery, not rich, becoming dry unless kept from the air. Ripens late autumn. Hardy and productive.

Flemish Beauty.* (Belle de Flandres.) Large, obovate, often obscurely tapering to the crown, very obtuse; surface slightly rough, with some reddish-brown russet on pale yellow ground; stalk an inch and a quarter long, rather slender; cavity round, deep, narrow, often acuminate, rim obtusely rounded; basin small, round; flesh juicy, melting, often with a very rich, sweet, and excellent flavor, but variable, and sometimes not high-flavored; needs house-ripening. Shoots dark brown, diverging and ascending; growth vigorous. Its value has become much lessened of late years by the cracking of the fruit. Fig. 682.

FIG. 680.—Washington. FIG. 681.—Laure de Glymes.

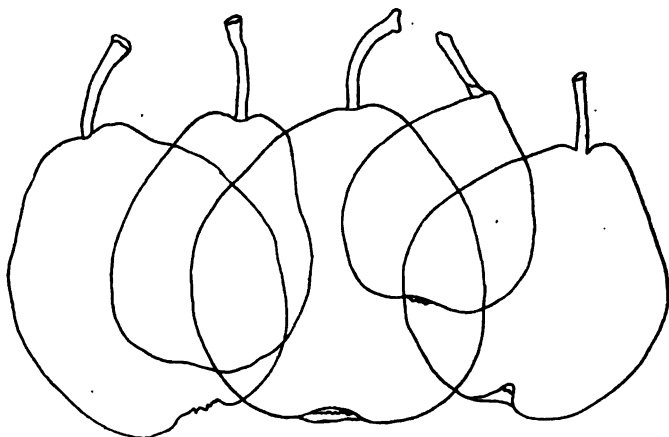


FIG. 682.—Flemish Beauty. FIG. 683.—Howell. FIG. 684.—Gray Doyenné.

Fondante de Malines. Medium, roundish-obovate; greenish, netted with russet, becoming rich yellow when ripe; stalk stout, long, curved, scarcely sunk; calyx small, closed; flesh buttery, melting, sweet, perfumed. Late autumn.

Golden Beurré of Bilboa. (Bilboa, Hooper's Bilboa.) Rather large, obovate, slightly pyriform, rather obtuse, very regular; surface smooth, fair, fine yellow, russeted round the stalk; dots small, distinct; stalk an inch and a quarter long, slightly sunk; calyx small, erect, basin shallow; flesh fine grained, very buttery, melting, moderately rich—sometimes an obscure acid astringency. Ripens the first of autumn, and immediately follows the Bartlett. Shoots yellow, ascending. A native of Bilboa, Spain.

Gray Doyenné.* (Doyenné Gris, Gray Butter Pear, Red Doyenné, Doyenné Rouge, St. Michael Doré.) Size medium, obovate, often approaching turbinate; whole surface a handsome, smooth cinnamon russet; stalk half to three-quarters of an inch long;

cavity quite narrow; calyx small, closed; flesh with a very fine texture, very buttery, melting, rich, perfumed, delicious, excellent. Middle of autumn to winter. Shoots yellowish or grayish brown, ascending. Fails by cracking in many localities. Fig. 684.

Hagerman. Medium, or small, roundish ovate; yellow, with a brownish-red cheek; stalk short, stout; basin shallow; flesh juicy, melting, quality very good. September. Origin, Long Island.

Hanners. Medium, oblong-obovate; yellowish-green, becoming pale yellow; stalk stout; flesh juicy, melting, very good. September.

Hardy. Large, long obovate, sometimes obscurely pyriform; skin greenish, with thin brown russet; stalk an inch long, cavity small, uneven, oblique; basin shallow; buttery, somewhat melting, rich, slightly sub-acid, good. October. Tree a strong grower, succeeds well on quince.

Heathcot.* (Gore's Heathcot.) Medium size, obovate, regular (Buffum form), base obtuse; surface greenish-yellow, partly overspread with thin russet; stalk an inch long, rather stout; cavity moderate or small; calyx partly closed; basin small; flesh fine grained, buttery, with a rich, perfumed, and excellent flavor—sometimes hardly first-rate. Early mid-autumn. Shoots slender, upright, reddish-brown. Very productive and profitable. Origin, Waltham, Mass. Fig. 639.

Henkel. Medium or rather large, round-obovate, remotely pyriform, with a very short neck, obtuse; surface yellow, often a clear pale yellow, sometimes partly russeted; stalk an inch and a half long, slightly sunk; basin small, even; flesh yellowish-white, buttery, melting, juicy, sprightly, fine, sometimes only second-rate. Shoots long, slender, erect, yellowish-brown; leaves small. Belgian.

Henry IV. (Ananas, Henri Quatre.) Rather small, round-obovate, somewhat turbinate; surface greenish-yellow, often somewhat russeted, sometimes a dark reddish-brown cheek; stalk an inch and a fourth long, slender, usually fleshy at insertion, not sunk; basin shallow, abrupt; calyx closed; flesh juicy, melting, rich, perfumed, mostly first-rate flavor. Needs house-ripening. Early in autumn. Shoots diverging or spreading, yellowish-brown. Very productive. Fig. 646.

Hericart. Medium, obovate, somewhat oblong and irregular, yellow, partly russeted; stalk slender, an inch or more long; cavity small, basin shallow; flesh fine-grained, buttery, often gritty and slightly astringent, not rich, but with a peculiar aromatic flavor. End of September.

Howell.* Rather large, wide-obovate, sometimes with a short obscure neck; light yellow, frequently with a handsome cheek, dots minute; stalk rather long and stout, a little fleshy at insertion, scarcely sunk; calyx in a small, smooth basin; flesh white, melting, buttery, moderately rich, aromatic, somewhat variable in quality. Tree a strong grower, fruit remarkably fair, mid-

autumn. Shoots brown, strong, erect, and ascending. New Haven, Conn. Fig. 683.

Hull. Medium size, obovate, rounded at base; skin yellowish-green, some russeted; stalk an inch and a half long, rather slender, not sunk; basin shallow; flesh melting, juicy, slightly gritty at core, sweet, often fine, sometimes poor. Shoots yellow, diverging, somewhat irregular. Origin, Swansea, Mass. A great bearer.

Jalousie de Fontenay Vendee.* (Fontenay Jalousie.) Size medium, conic-turbinate, approaching thick-pyriform; surface a pale dull yellowish-green, more or less russeted, often a faint red cheek; stalk an inch long, often oblique, not sunk; calyx closed, stiff; basin small, round; flesh buttery, melting, mild, rich, fine flavored. Ripens at mid-autumn. Shoots greenish, rather erect, leaves long. French.

Johonnot. Rather small, roundish-obovate, sometimes nearly round, irregular; skin pale greenish-yellow and yellowish-brown, faintly russeted; stalk about an inch long, thick, oblique, fleshy at insertion, not sunk; basin round; flesh rather coarse, melting, buttery, rich, of fine flavor. Early mid-autumn. Origin, Salem, Mass. The value of this fine little pear is lessened by the slow growth of the tree. Shoots reddish, short, diverging.

Jules Bivort. Rather large, obovate, or nearly Doyenné form; skin yellow, thickly dotted, and with much cinnamon russet; stalk long, inclined; cavity broad; basin small; flesh firm, buttery, juicy, very rich, excellent, perfumed. November. Belgian.

Kingsessing.* Large, broad, obovate, or Doyenné form, approaching pyriform; greenish-yellow, thickly dotted; stalk medium or long, curved; cavity broad, uneven; calyx closed; basin shallow, irregular; flesh granular, buttery, melting, with a sweet, very good flavor. September. Shoots rather erect, greenish; leaves recurved. Pennsylvania. A lardy bearer. Fig. 630.

Kirtland. Rather small, roundish-obovate; covered with a rich russet, often reddened in the sun; stalk short, stout, often fleshy at insertion; calyx partly open, basin shallow; flesh buttery, very rich, perfumed, somewhat resembling its parent, the Seckel. Often rots at core, and does not always soften well; requires early gathering. First of September. Ohio.

Laure de Glymes. Medium or large, turbinate, or nearly Bloodgood-shaped; whole surface nearly covered with russet, becoming rich orange-yellow at maturity; stalk nearly an inch long, fleshy at base, not sunk; basin shallow, smooth; flesh buttery, high flavored, perfumed, very good. Middle of autumn, sometimes continuing quite late. Belgian.

Lyon. Size medium, Doyenné-shaped; skin yellow, thick, smooth, with a blush, finely dotted, russeted about the stalk; stalk scarcely sunk; calyx nearly closed; basin small; flesh coarse, a little gritty at core, vinous, very good. Resembles Buffum in tree and productiveness, but less dry and two weeks earlier. Newport, R. I.

Moore's. (Moore's Pound, Hosenshenck.) Large, obovate or

nearly round; skin smooth, green, becoming rich yellow, with a slight blush, thinly and minutely dotted; stalk short, not sunk; basin small, wrinkled; flesh juicy, melting, rich, vinous. Ripens in September, and keeps well. Tree vigorous, productive.

Mount Vernon. (Walker's Seedling.) Medium, obovate, irregular; dull brownish russet, with a red cheek; stalk very short, oblique, scarcely sunk; basin shallow, smooth; flesh greenish-white, a little coarse, rich, vinous, aromatic. October, November. Roxbury, Mass.

Omer Pacha. Medium, turbinate, smaller specimens roundish-turbinate; skin green, partly russeted around the stalk; juicy, buttery, vinous. First of September.

Oswego Beurre. Size medium, obtuse oval-obovate, regular; surface yellowish-green, with some thin russet; stalk three-fourths of an inch long, stout, deep set; calyx small, erect, or closed; basin smooth; flesh melting, juicy, with a fine, sprightly vinous flavor at first, becoming nearly sweet. Ripens from mid-autumn till winter, often cracks badly. Tree vigorous, hardy, very productive. Origin, Oswego, N. Y.

Petré. Medium size, obovate, sometimes slightly obovate-pyriform or truncate-conic, base or stalk end wide or obtuse; surface pale yellow, often slightly russeted, with a reddish-brown cheek; stalk about an inch long, rather stout, cavity obtuse at bottom; basin small, smooth; flesh fine-grained, sometimes slightly gritty, buttery, melting, rich, sweet, perfumed, often excellent—variable in quality from first to second rate. Ripens at mid-autumn. Growth moderate, shoots rather slender, yellowish.

Philadelphia. Large, roundish-obovate, broad, remotely approaching Diel form; skin yellow, thickly dotted, sometimes partly russeted; stalk stout, cavity abrupt; basin broad, uneven; flesh coarse, buttery, melting, with a very good flavor, slightly perfumed. September.

Preble. Large, oblong, obovate; greenish-yellow, somewhat russeted; stalk an inch long, stout, a little sunk; flesh buttery, melting, with a rich, high flavor. October, November. Maine.

Raymond. Medium, obovate or Doyenné-shaped; skin yellow; stalk an inch long, scarcely sunk; basin shallow; flesh buttery, melting, excellent. September. Maine.

Seckel.* Small, obovate, sometimes obscurely conic-pyriform, regular; skin brownish green, becoming rich yellowish brown, with a deep brownish-red cheek; stalk one-half to three-fourths of an inch long, cavity and basin small; flesh very fine-grained, sweet, very juicy, melting, buttery, the richest and highest flavored pear known. Although of slow growth and small size, like the Green Gage among plums, it is regarded as the standard of excellence. Its high musky perfume is not, however, agreeable to all. Early mid-autumn. Shoots stout, short, ascending; tree very hardy. Needs rich cultivation. Origin, near Philadelphia, and succeeds well throughout the Northern, Middle, and Western States, and is remarkably free from the blight.

Serrurier. (Fondante de Millot.) Medium, conic-obovate, obtuse; yellow, thickly dotted, slightly russeted; stalk rather short; cavity small, basin shallow; flesh slightly granular, juicy, melting, brisk, vinous. September, October.

Shepard. (Shepard's Seedling.) Medium or large, obovate, ribbed toward the crown; yellow, slightly russeted, thickly dotted; stalk an inch long, slightly sunk; calyx erect, basin ribbed, flesh very melting and buttery, of a fine, agreeable flavor. Early October. Dorchester, Mass.

St. Andre. Size medium, obovate-turbinate, crown blunted; skin greenish-yellow, slightly dotted red; stalk an inch long, fleshy at insertion; basin shallow; flesh greenish-white, fine-grained, buttery and melting, perfumed, excellent. September. Bark cracks.

Sterling. Medium or rather large, roundish-obovate, sometimes obscurely pyriform; light yellow, often with a little russet, and a red cheek; stalk long and stout, inserted in a slight cavity by a fleshy ring; basin shallow, uneven; flesh rather coarse, juicy, half melting, good. First of September. The strong upright growth and productiveness of the tree, and the handsome appearance of the fruit, render the Sterling a market variety, although not standing very high in quality. Origin, Livingston County, N. Y.

Superfin.* Medium, roundish-obovate, with a small, narrow neck tapering into the stalk; greenish-yellow, somewhat russeted and sometimes a brownish cheek; very juicy and melting, with a rich, agreeable, vinous, and sub-acid flavor. October. Tree vigorous. Grows well on quince.

Surpasse Virgalieu. Medium obovate, sometimes roundish-obovate; pale yellow, dots few, minute; sometimes faintly reddened to the sun; stalk medium; cavity moderate, oblique; basin small; flesh white, fine-grained, buttery, melting, high-flavored, excellent.

Tea. Medium, roundish-obovate, approaching pyriform; yellow, numerously dotted; stalk rather stout, cavity small, calyx half closed; basin shallow; flesh white, juicy, melting, vinous, very good. First of September. Milford, Conn.

Thompson's. Medium in size, obovate, slightly pyriform; yellow, slightly russeted; stalk an inch long, or less, stout; calyx stiff, scarcely cut; buttery, melting, and fine flavored. Late autumn.

Van Assche. (Van Assene.) Rather large, broad, obovate, slightly angular; crown obtuse, sides rounded; skin fair, smooth, dull yellow; stalk an inch and a quarter long, slender, curved, moderately sunk; calyx closed; flesh white, rather coarse, buttery, melting, rich. Shoots light brownish-purple, diverging; leaves considerably serrated. Belgian.

Vermont Beauty. Medium, obovate yellow, bright carmine cheek; flesh rich and juicy, sub-acid.

Washington.* Medium in size, oblong-obovate, obtuse, sometimes slightly obtuse-pyriform; surface smooth, clear yellow, handsomely marked with conspicuous red dots on the sunny side, slightly russeted round the stalk, which is an inch and a fourth

long, and slightly sunk; calyx small, partly closed, basin shallow; flesh very juicy, melting, slightly breaking, with a rich, unusually sweet, perfumed, excellent flavor. Early in autumn. Growth vigorous, shoots brown speckled, straight, erect, and diverging. Fruit always fair, but varies in size and form—esteemed most by those who like a very sweet flavor.

Westcott. Size medium, roundish-obovate, green, becoming yellow; flesh melting, juicy, good; not worthy of extension. Early in autumn. Origin, Cranston, R. I.

Wilbur. Medium in size, frequently rather small; obovate, regular, often obovate-pyriform; skin a dull green and russet; stalk three-fourths to one inch long, cavity very small; calyx prominent, scarcely sunk; flesh rather coarse, melting, juicy, pleasant, often slightly astringent, varying. Early autumn. Shoots slender, yellowish-brown. Origin, Somerset, Mass.

Wilkinson. Size medium, obovate, narrowed somewhat toward the crown, largest in the middle; skin smooth, bright yellow; stalk an inch and a quarter long, stout, scarcely sunk; calyx stiff, short, basin shallow; flesh white, juicy, melting, sweet, rich, of good flavor. Ripens from mid-autumn to winter. Shoots long, stout, upright, greenish-yellow; tree thrifty, hard, productive. A good second-rate variety. Often fails by cracking. Rhode Island.

White Doyenné.* (Butter Pear of Pennsylvania, Virgalieu of New York, St. Michael of Boston, Yellow Butter, white Beurré, Doyenné, Doyenné Blanc.) Medium or rather large, regular obovate, obtuse, sometimes remotely pyriform; surface pale yellow, often a faint blush, stalk about an inch long, scarcely sunk; calyx small, basin shallow; flesh of very fine texture, white, buttery, melting, rich, and excellent. Middle to late autumn. Shoots ascending, grayish-yellow; leaves folded, recurved. It fails by cracking in many localities, but in portions of the Western States it is unsurpassed in its excellent qualities of hardy growth, fair fruit, delicious flavor, and great productiveness. North of forty-two degrees of latitude, it becomes a late autumn fruit, and may be kept into winter. Fig. 686.

CLASS III. ROUNDISH OR OBLATE.

Church.* Size medium, roundish oblate, with a very short neck, irregular; yellow, with minute dots; stalk rather long and stout, scarcely sunk; basin broad and shallow, slightly furrowed; flesh fine, very buttery, melting, with a very sweet, rich, and excellent flavor. Ripens through September. Tree vigorous and spreading, uniformly productive, and fruit unvarying in good quality. New Rochelle, N. Y. Fig. 687.

Des Nonnes. (Beurré de Brignais.) Size medium, roundish-turbinate, obtuse; greenish-yellow becoming clear yellow with many dots; stalk long, rather slender, a little curved, slightly sunk; calyx rather small, often closed in a small wrinkled basin; juicy and exceedingly melting when at perfection, very sweet,

perfumed, with an excellent, delicate flavor. Variable, sometimes quite moderate. September. Fig. 689.

Fulton. Rather small or nearly medium; roundish, crown flattened; whole surface a smooth gray russet, becoming a dark cinnamon russet; stalk an inch and a quarter long, slender, cavity round, rather narrow; calyx long, deep cut, basin uneven; flesh half buttery, melting, rich, sprightly, agreeable, nearly or quite first-

FIG. 685.—Robin.

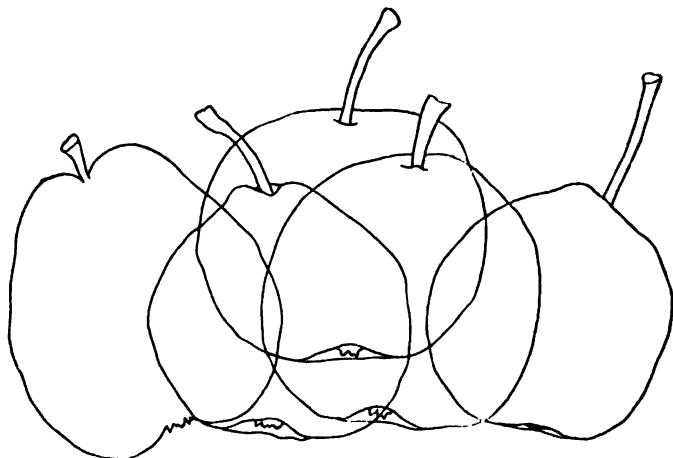


FIG. 686. FIG. 687. FIG. 688. FIG. 689.
White Doyenné. Church. Sheldon. Des Nonnes.

rate. Ripens middle and late autumn. Shoots rather slender, reddish brown. Tree very hardy and productive. Valuable. Origin, Topsham, Me. Fig. 651.

Gansel's Bergamot. (Brocas Bergamot.) Rather large, sometimes only medium; roundish-ovate, more or less approaching obovate, flattened most at crown; skin yellowish-brown, with a faint russet brown bluish; stalk short, half or three-fourths of an inch long, ends often fleshy; cavity and basin smooth; flesh granular, melting, juicy, rich, sweet, perfumed, with a very good flavor. Ripens through several of the early weeks of autumn. Shoots short, dark gray, spreading; leaves flat, mealy. English. Fig. 650.

Goubalt. Rather small or medium, roundish-ovate, with a slight neck; greenish-yellow; stalk long, cavity small, calyx large; basin shallow; juicy, not high-flavored. September. Tree vigorous, an early and great bearer. Fig. 649.

Huntington. Size medium, roundish, approaching obovate; yellow, rough, sometimes shaded crimson, slightly russeted, thickly dotted; stalk medium or long; cavity broad, uneven, basin mod-

erate; flesh white, juicy, buttery, and melting, sweet, perfumed, excellent. Last half of September. Origin, New Rochelle, N. Y.

Idaho. (Mulkey.) Large, nearly round, regular; golden yellow, many russet dots; cavity irregular, rather deep; basin shallow, pointed; flesh melting, juicy, sprightly, vinous, good. Early autumn. Idaho. Fig. 691.

Merriam. Rather large, roundish, approaching oblate; rich yellow, partly russeted; stem short, cavity small, calyx closed; basin shallow, furrowed; flesh rather coarse, juicy, melting, perfumed, very good. Middle of autumn. Popular at Boston.

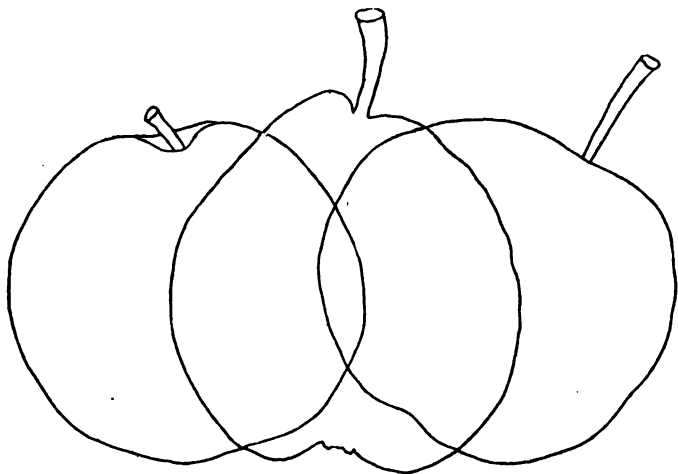


FIG. 690.—Stevens' Genesee. FIG. 691.—Idaho. FIG. 692.—Le Conte.

Robin. Size above medium, round, nearly regular, or obscurely and obtusely ribbed; skin pale yellow, usually russeted about the crown; stalk an inch and a half long, generally set in a rather deep, smooth cavity, sometimes merely planted on the surface; calyx in a smooth or scarcely furrowed basin; flesh buttery, melting, with a fine, "very good" flavor. Shoots brownish-green, rather erect. Fig. 685.

Roe's Bergamotte. Medium, oblate, irregular; skin yellow, reddened to the sun; stalk short, cavity narrow, abrupt; calyx small, basin narrow; flesh rather coarse, sweet, rich, perfumed. September. Shoots dark reddish brown, diverging, leaves small, somewhat curled. Newburg, N. Y.

Sheldon.* Medium or large, roundish, sometimes approaching broad obovate; greenish-russet becoming cinnamon brown; stalk short, cavity narrow; basin smooth, rather deep; flesh a little coarse, very melting, juicy, with a very brisk, vinous, excellent

flavor. October. Tree vigorous, shoots ascending, yellowish-brown. It requires double working on the quince. Fig. 688.

Stevens' Genesee.* Large, round-obovate, often considerably flattened; skin slightly rough, yellow; stalk an inch long, stout, thickest at insertion, more or less sunk in the base; calyx short, stiff, basin smooth; flesh moderately fine-grained, half buttery, slightly granular, with a rich, very good flavor. Ripens the first of autumn and for some time afterward. Rots at core when not gathered early. Shoots gray, leaves narrow. Origin, Livingston County, N. Y. Fig. 690.

DIVISION III.—WINTER PEARS.

CLASS I. DISTINCT PYRIFORM.

Aremburg. Medium or large, short pyriform, sometimes approaching conic-obovate, neck rather small; skin thick, greenish-yellow, partly russeted; stalk short or half an inch to an inch long, thick, oblique, thickening with flesh toward insertion; calyx erect; basin deep, narrow; flesh buttery, melting, rich, sub-acid, variable. Often too astringent. November and December.

Bachelier and Dumas, described among autumn pears, pages 259 and 263, often keep into winter and become winter varieties.

Black Worcester. (Iron Pear, Black Pear of Worcester.) Large pyriform (Diel-shaped), sometimes approaching oblong-ovate; surface mostly covered with dark rough russet on a light green surface; stalk half an inch to an inch and a half long; cavity none; calyx erect, basin small; flesh hard, coarse, rich, somewhat austere; stews and bakes well. An esteemed culinary sort, bearing heavy crops, and proving profitable for market. Late autumn till midwinter. Growth very crooked and straggling. Fig. 622.

Catillac. Large, short, conic-pyriform, approaching broad-turbinate; crown broad, flattened; yellow, often with a reddish-brown cheek; stalk an inch to an inch and a half long, stout, cavity small, wavy; calyx short, erect, or spread, basin large, plaited; flesh hard, but excellent for baking and stewing, becoming tender, and of a light red color. Keeps through winter. French.

Chaumontel. (Bezi de Chaumontelle, Winter Butter.) Large, pyriform, body oblong or ovate, neck short, obtuse, often quite obscure, and the form approaching obovate or oblong—largest at the middle; skin a little rough, yellowish in the shade, with more or less brownish-red, and rich deep red in the sun; stalk an inch long, moderately sunk; basin deep, uneven, or angular; flesh buttery, melting, sugary, with a fine flavor. Requires warm, rich cultivation to develop its good qualities, often poor. Shoots long, slender, dark brown. Grows well on the quince. Early winter. Old French.

Clairgeau.* Large, pyramidal-pyriform, approaching long obovate, skin yellow or yellowish-brown, often with a crimson shade toward

the sun, and brown dots; stalk short, stout, fleshy, oblique, sunk little or none; basin shallow, furrowed; flesh white, slightly granular, buttery, melting, often with a rich, very good flavor, but frequently poor. November, December. Shoots reddish-purple, short, erect, and ascending; leaves stiff. Fig. 694.

Colmar.* (Colmar Souverain, Colmar Hardenpont, Colmar Gris.) Medium or rather large, distinct pyriform; skin yellowish-green, becoming pale yellow, often lightly sprinkled with russet; stalk an inch and a quarter long, cavity obtuse or none, calyx erect, basin moderate; flesh fine-grained, buttery, juicy, sweet, rich, and when well grown and ripened of excellent, first-rate flavor—but if

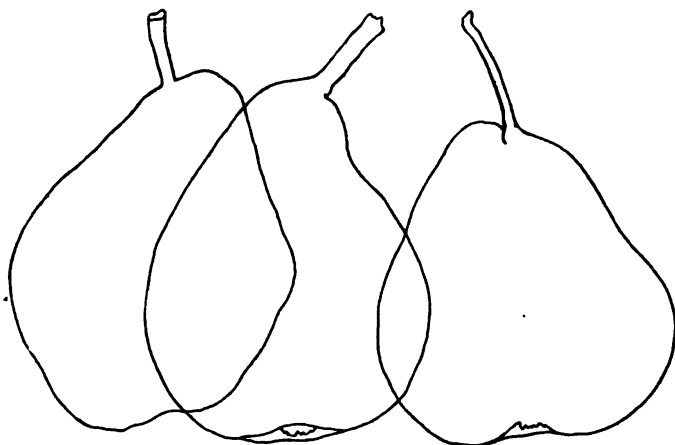


FIG. 693.—Glout Morceau. FIG. 694.—Clairgeau. FIG. 695.—Colmar.

small and badly matured or overloaded trees, the quality is worthless. The tree overbears, and the fruit needs thorough thinning. Leaves rather small, nearly flat. Early winter. Belgian. Fig. 695.

Fondante de Noel. (Belle Apres Noel.) Medium or rather small, obtuse-pyriform; pale greenish-yellow, with a red cheek; stalk long, stout, curved, oblique; calyx closed; basin broad, shallow, irregular. Shoots greenish yellow, growth resembles Passe Colmar; flesh whitish, melting, juicy, very good. A seeding of the Passe Colmar, ripening earlier, and of similar flavor—a fine late autumn and early winter sort. Belgian.

Glout Morceau.* (Gloux Morceaux, Beurré d'Hardenpont, Colmar d'Hiver, Hardenpont d'Hiver, Linden d'Automne.) Large, short, pyriform, approaching obtuse-oval, neck very short and obtuse, body large, and tapering somewhat toward the crown; often considerably ribbed; surface green, becoming pale greenish-yellow; stalk an inch and a fourth long, stout, moderately sunk;

calyx large, basin distinct, rather irregular; flesh white, fine-grained, buttery, melting, rich, sweet, and of fine flavor. Early winter. Succeeds best on the quince. Shoots spreading, greenish; leaves wavy or wrinkled. Variable, sometimes poor, best on trees of several years' bearing; excellent when fully grown and well ripened. Fig. 693.

Goubalt. Rather large, roundish-pyriform, approaching roundish-obovate, pale dull yellow, russeted at stalk and calyx; stalk short, thick, calyx small, deeply sunk; melting, juicy, rich, aromatic. December to February. Shoots greenish yellow, slightly purple, a slow grower. Fig. 649.

Inconnue Van Mons. Small, conic-pyriform (Madeleine-shaped), approaching obovate; skin rough, green, becoming yellowish, sprinkled with russet; stalk rather long, curved, slightly sunk; basin small; flesh granular, juicy, melting, rich. Early winter. Fig. 635.

Jaminiette. (Josephine.) Medium or rather large, obovate-pyriform, approaching obovate, small specimens roundish-turbinate, varying; crown broad; skin yellowish-green, with some brownish-russet, dots numerous, often confluent; stalk three-fourths to an inch long, thick; cavity little or none; calyx small, erect, stiff; basin round, even, flesh juicy, melting, buttery, sweet, of good flavor. Late autumn and early winter. Shoots somewhat reddish-green, erect, diverging. Origin, Metz, in France. A very strong grower on the quince.

Langelier.* Size full medium, pyriform or Urbaniste-shaped; pale yellow, slightly russeted; stalk short, cavity small; basin somewhat irregular; flesh juicy, buttery, melting, with a sweet, rich, slightly vinous flavor. Early winter. Tree a good grower on pear and quince. A light bearer on young trees. Shoots greenish, often upright, irregular; leaves broad. Fig. 632.

Las Canas. Size medium, regular pyriform, somewhat conic (Tyson-shaped); neck tapering into the stalk; skin yellow, sometimes sprinkled with thin russet, rarely with russet blotches, dots small and numerous; stalk an inch long; calyx slightly sunk; flesh juicy, often good. Fig. 624.

Lawrence.* Size medium, pyriform, approaching obovate, somewhat uneven; lemon-yellow with numerous small dots; stalk an inch long, set in a small basin, ribbed; flesh whitish, buttery, with a rich, aromatic, very good flavor. December. Growth moderate, spreading. Shoots yellowish-green. An early and good bearer, and unexcelled as a valuable early winter sort. It ripens easily, and is of uniform excellence. Fig. 703.

Lycurgus. Small, pyriform, approaching obovate, narrowing off to the crown; dark, dull green, rough, russeted; stalk short, slender, twisted, not sunk; calyx large, slightly sunk; flesh greenish-white, a little coarse, rich, very high-flavored. December. A supposed seedling of the Seckel.

McLaughlin. Large, pyramidal-pyriform, often roundish-obovate when small; skin rough, partly russeted, greenish, becoming yel-

low; stalk short, oblique, not sunk; basin shallow; flesh juicy, melting, sweet, rich, perfumed. Early winter. Maine.

Pater Noster. Large or medium, pyriform approaching pyramidal, somewhat irregular; yellow, often russeted, sometimes with a red cheek; stalk an inch long, fleshy at insertion, scarcely sunk; basin narrow; flesh buttery and melting, fine-grained, rich, slightly sub-acid, often a little astringent. Early winter. Shoots short, greenish-purple, erect. Often ripens wholly in autumn.

Pound.* (Winter Bell, Uvedale's St. Germain, Angora.) Very large, pyriform, crown wide; skin yellowish-green, with a brown cheek; stalk two inches long, calyx crumpled, basin narrow; flesh solid, hard; stems reddish color; a good culinary pear. Tree strong, healthy, productive. Shoots stout, upright, dark. Fig. 618.

Reading. Rather large, pyriform, regular, tapering somewhat to the crown, often ribbed; thickly dotted and slightly russeted, on a greenish-yellow skin; stalk long, curved, enlarged at insertion, slightly sunk; basin little or none; flesh granular, rather melting, juicy, vinous, pleasant, good. January, and later. Shoots brownish-olive, rather erect, long, slender. Pennsylvania.

St. Germain. Large, long pyriform, small specimens obovate; surface yellowish-green, faintly tinged with brown to the sun; stalk an inch long, oblique; basin small and shallow; flesh white, slightly gritty, juicy, melting, sub-acid. Fails in many localities, and becomes a poor fruit. Late autumn and early winter. Shoots slender, light olive, leaves narrow, folded, and recurved. The striped St. Germain is a sub-variety, differing only in its faint yellow stripes.

Suzette de Bevy. Rather small, obovate-pyriform, inclining to conic; dull yellow, dots minute; stalk long, curved, basin shallow, uneven; flesh melting, vinous, perfumed. January to March. Belgian.

Vicar of Winkfield.* (Le Curé, Monsieur le Curé, Clion.) Quite large, long pyriform, with a conical taper toward the crown; skin smooth, pale yellow, or pale yellowish-green, with a dull reddish cheek; stalk an inch to an inch and a half long, slender, often fleshy at insertion, oblique not sunk; basin narrow, very shallow; flesh greenish or yellowish-white, juicy, buttery, with a moderate flavor—sometimes slightly astringent. Ripens late autumn and early winter, for about two months. Growth spreading and irregular, or straggling; shoots strong, dark olive. Grows well on quince stocks. The great and uniform productiveness of this pear, its fine qualities for cooking, and the long period of its continuance, render it valuable. Fig. 613.

Willermoz. Rather large, pyriform, elongated toward the crown; skin rough, green, becoming yellow, dull red to the sun; stalk one inch long, not sunk; basin moderate, rather distinct; flesh rather coarse, granular, buttery, somewhat acid, often astringent—variable. Early winter. Shoots greenish-purple, diverging; leaves dark green. Often ripens in autumn.

Winter Nelis.* (Nelis d'Hiver, Bonne de Malines.) Size rather small or medium, roundish-pyriform, often obovate, neck small and short; surface yellowish-green, much russeted; stalk an inch and a quarter long, bent; cavity narrow; calyx stiff, short; basin shallow, ribbed; flesh yellowish-white, fine-grained, buttery, very melting, rich, sweet, or slightly vinous, perfumed, aromatic, with an excellent flavor. Early winter. Growth slender, flexuous, and straggling; leaves narrow, recurved; petioles rather long. Origin, Mechlin, in Belgium. Fig. 704.

CLASS II. OBSCURE PYRIFORM, OBOVATE OR TURBINATE.

Alençon.* (Doyenné d'Hiver Nouveau, Doyenné Gris d'Hiver Nouveau, St. Michael d'Hiver.) Medium, obovate, approaching pyriform when large, skin rough; yellow, with russet or brown dots; stalk medium, stout, moderately sunk, basin deep; flesh somewhat granular, buttery, juicy, rich, sprightly. December to April. Although not of the highest flavor, this pear is one of the most valuable and reliable of good-keeping winter pears.

Alexandre Lambre. Size medium, roundish-obovate; yellowish-green marbled with red toward the sun; stalk stout, not sunk; basin shallow; flesh juicy, melting, sweet, rich, sometimes very good, frequently poor. November, December. Shoots slender, yellowish, spreading.

Anjou.* Commences ripening in autumn. See Autumn Pears.

Brande's St. Germain. Size medium, obovate, often considerably pyriform, narrowing to both ends, smooth and regular; skin yellowish-green, thickly dotted with large russet specks; stalk an inch long, thick, obliquely set; calyx small, stiff, erect; basin small, narrow, often none; flesh buttery, melting, yellow toward the core, with a pleasant, slightly acid, good, or very good flavor. Early winter. English.

Columbia.* (Columbian Virgalieu, Columbia Virgouleuse.) Large, long obovate, regular, handsomely rounded or obtuse, largest nearest the middle; surface pale green, becoming pale yellow, always smooth and fair; stalk an inch and a quarter long, rather slender; cavity narrow, deep; calyx erect, basin small; flesh white, melting, and buttery, of moderately rich flavor. Ripens early winter. Growth upright, vigorous, shoots brownish yellow. The large, handsome fruit, and the great productiveness of the tree, have rendered this variety popular and profitable for market, although not high in quality. It does not appear to succeed so well as far north as Boston or Rochester as farther south. A native of Westchester County, N. Y.

Coter. Size medium, obovate, obscurely pyriform, nearly regular; light yellowish-green, brown in the sun, somewhat russeted; stalk an inch long, without cavity; segments of the calyx distinct and widely reflexed; basin round, moderate; flesh white, rather coarse, buttery, rich, slightly perfumed, very good. Late autumn. Belgian.

Dana's Hovey. Rather small, obovate, slightly pyriform; rich yellow, with some cinnamon russet; stalk medium, slightly sunk, basin shallow; flesh buttery and melting, of excellent quality. December. Shoots stout, erect. New. Massachusetts.

Easter Beurré.* (Doyenné d'Hiver, Bergamotte de la Pentacôte, Beurré de la Pentacôte, Beurré de Pâques, Chaumontel très gros, Canning Seigneur d'Hiver.) Large, obovate, approaching oval; surface yellowish-green, with some russet; often a broad, dull reddish cheek; stalk stout, an inch long; cavity deep, sometimes

FIG. 696.—Josephine de Malines.

FIG. 697.—Sieulle.

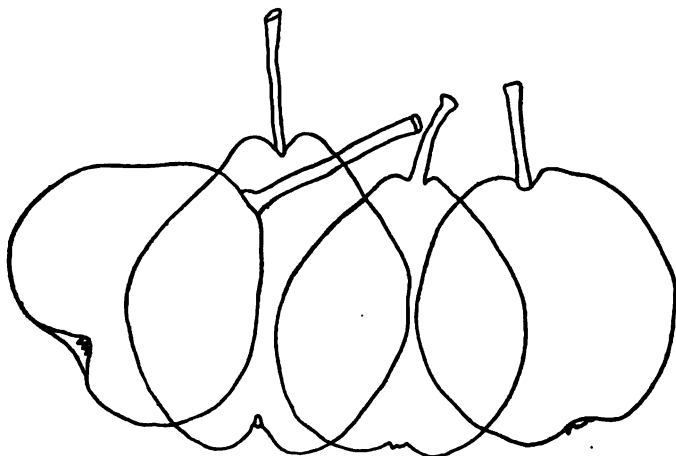


FIG. 698.—Kieffir. FIG. 699.—Koonce.

obtuse, abrupt; calyx small, closed in a moderate or rather shallow, plaited basin; flesh fine-grained, very buttery, melting, and juicy, and when well grown and ripened, of excellent flavor. It does not often mature well in the Northern States. Keeps through winter. Growth strong, rather upright, shoots reddish-yellow; leaves narrow, folded, recurved. Grows well on the quince. Fig. 702.

Grand Soleil. Rather small, roundish-obovate, irregular, and varying, mostly covered with a rich russet; calyx small, closed; flesh yellowish-white, a little coarse, buttery, melting, aromatic, very rich. November and December. Belgian.

Gris d'Hiver.* (Beurré Gris d'Hiver Nouveau, or "Gray Winter Beurré.") Size medium, obovate, or short Doyenné-form, obtuse; skin greenish, considerably russeted; stalk thick, short, cavity moderate, basin small; flesh greenish, buttery, melting, very juicy, rich, slightly sub-acid—resembling in flavor the Beurré d'Aremberg, but rather richer and less acid. Early winter.

Shoots purplish-red, leaves curled. French. Promises to become valuable. Fig. 644.

Jean de Witte. Size medium, flattened, obovate; stalk short, slightly sunk; basin small, calyx closed; skin yellowish green, partly russeted; flesh white, juicy, melting, sweet, rich. December.

Jones. (Jones' Seedling.) Size medium or small, Bloodgood-shaped, or obovate, remotely pyriform; surface rich yellow russet; stalk an inch or an inch and a fourth in length, variable in thickness, fleshy at insertion, not sunk; basin shallow; flesh yellowish, melting, of fine flavor. Ripens late autumn and early winter. Shoots diverging and ascending. Origin, Kingessing, near Philadelphia. Productive and valuable. Fig. 700.

FIG. 700.—Jones' Seedling. FIG. 701.—Gregoire.

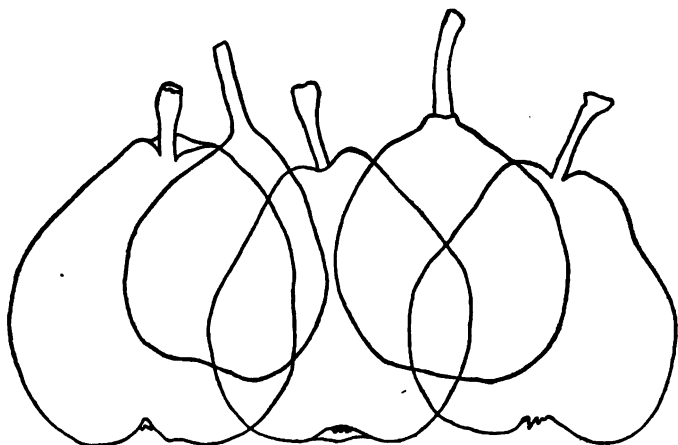


FIG. 702.—Easter Beurré. FIG. 703.—Lawrence. FIG. 704.—Winter Nellie.

Lewis. Size below medium, regular obovate, rarely obscure pyriform; surface yellowish-green, thickly dotted with dull russet; stalk an inch and a half long, slender, scarcely sunk; calyx widely reflexed, basin little or none; flesh greenish-white, melting, juicy, of fine, rich flavor. Core large. Early winter. Growth vigorous, branches becoming drooping. Profusely productive. Origin, Roxbury, Mass.

Prince's St. Germain.* Size medium, obovate, obtuse; surface much russeted on green, dull red to the sun; stalk an inch and a fourth long, cavity small; calyx large, stiff, slightly cut, basin smooth, shallow; flesh yellowish-white, juicy, melting, slightly vinous, with an agreeable and fine flavor. Keeps well, ripening through winter. Origin, Flushing, L. I.

Vicomte de Spoelberch. (De Spoelberg, Delices Van Mons.)

Medium or rather large, obovate, somewhat conic; skin slightly rough, yellow, with a purplish blotched cheek to the sun, very slightly russeted; stalk an inch and a fourth long, stout, curved, basin round, shallow; calyx erect, short; flesh buttery, melting, rich, fine. Needs high cultivation to develop its fine qualities. Early winter. Belgian.

Zephirin Gregoire. Medium, turbinate, Bloodgood-shaped; light green becoming yellow, reddened next to the sun; stalk one inch long, fleshy at base; basin narrow; flesh white, buttery, melting, fine-grained, excellent, perfumed. November to February.

CLASS III. ROUNDISH OR OBLATE.

Cross. Medium in size, roundish; surface yellow, often with a red cheek, and some russet; stalk three-fourths of an inch long, very thick, set shallow; calyx small, rather deeply sunk; flesh melting, juicy, with a rich, high, fine flavor. Early winter. Shoots rather slender, a poor grower—of little value. Massachusetts.

Josephine de Malines.* Size medium, conic-oblate; yellowish with small dots; stalk very long, cavity slight, basin large; flesh of a light salmon color toward the centre, buttery, of a sweet and peculiar flavor. The tree forms a handsome pyramid on quince. This is one of the best early winter pears, often keeping till mid-winter and later. Belgian. Fig. 696.

Sieulle. (Beurré Sieulle, Doyenné Sieulle.) Medium in size, roundish-oblate, often roundish-obovate, with a very short, obscure neck, obtuse; skin pale yellow, with a slight blush, and sometimes a brilliant broad orange cheek; stalk thick, an inch and a quarter long; cavity shallow, rarely deep; calyx slightly sunk; flesh buttery, fine-grained, rich, of good, often of excellent quality. Ripens late in autumn, and keeps to midwinter. Variable, uncertain. Fig. 697.

CHAPTER XXX.

PLUMS.

IN no branch of pomology has greater progress been made the past twenty years than in the improvement and development of our native plums and in the introduction of foreign varieties. The bringing in of the Japanese plums marks an era in fruit culture in the United States.

The number of new sorts of plums which have been added to the list under cultivation makes it necessary, for their intelligent selection and propagation, to amplify the classification of the varieties of this fruit from the simple division according to color, to one more scientific and accurate. The study and published conclusions of such leading investigators as Prof. C. J. Sargent, Professor Bailey, of Cornell University, and Mr. Berckmans, of Augusta, Ga., have made this a comparatively easy matter.

PROPAGATION.

Seedlings.—As with most fruits, plums rarely come true from seed, although some varieties vary but little from the parent stock.

The stones should be selected from the choicest kinds and treated in planting precisely as directed for the peach, but greater care must be exercised to prevent their drying, which occurs much in consequence of their smaller size and thinner skin. It is better to crack them, without which many will not vegetate the first year.

Stocks.—The stocks heretofore used for growing plums have generally been seedlings of the domestic type (especially the Myroblan or cherry plum), which when the varieties of the European plums do well are usually satisfactory, although upon light or unfavorable soils they are apt to produce feeble and slowly growing seedlings. For the Southern States the

Chickasaw stock is preferable, and in the Northern States and throughout the country generally seedlings of the best of the Americana group, in consequence of their greater hardiness, are most desirable of all. Peach stocks, used in the past to some extent, are now seldom propagated upon.

All trees grown on Chickasaw stock are inclined to sucker. Plums of the Domestica group grafted upon native stocks are said to grow so poorly as to overtop the stock, and become liable to injury from strong winds.

Grafting and Budding.—Crown grafting is recommended by most of the experiment stations. The scions should be cut in the fall, three or four buds to each (see pages 30 and 31, for direction for keeping through the winter.) Put in the scions early in the spring before there are any signs of the buds starting.

Budding must be performed while the stocks are at the period of their most vigorous growth, provided sufficiently matured buds can be found, which is usually soon after mid-summer. If deferred, the bark will not peel freely, and the buds will not adhere.

CULTIVATION.

Soil.—The best soil, usually, is a strong, rich, clayey loam. On many light soils the tree grows with less vigor, independently of which the crop is more frequently destroyed by the curculio, a previous soil affording a more ready place of shelter for the young insects, on their escape from the fallen fruit. A few varieties are well adapted to rather dry as well as light lands. Applications of potash and ground bone, as usual with other fruits, is of advantage in increasing the fruitfulness of the plum.

In planting orchards, a suitable distance is one rod apart, giving one hundred and sixty trees to the acre. The ground should be manured and kept well cultivated, as the plum, especially when young, is sensitive to the effects of the weeds and grass of neglected culture.

Impotency.—It is well known that some of the native varieties are so deficient in fertile pollen, that they are almost incapable of fertilizing themselves. It is therefore advised that

trees of the *Domestica* class be planted with them, mixing them in the rows or groups.

CLASSIFICATION.

With but comparatively few exceptions the varieties of plums grown in gardens, and for commercial purposes, may be included in five groups. As this work aims to be of a practical rather than scientific character, these only will be considered. They are

NATIVE PLUMS.

I.

The Americana Group—Prunus Americanus.

Comprises a class of hardy, vigorous young trees, the wild forms of which are found growing throughout the Northern States. The fruits differ widely in all their characteristics.

II.

The Wild Goose Group—Prunus Hortulana.

This class has heretofore been included in the Americana, but it has recently been separated by Professor Bailey into an independent group, and includes the Miner type.

III.

The Chickasaw Group.—Prunus Angustifolia.

It is found growing wild in the Southern States.

IV.

The European Group—Prunus Domestica.

Most of the finest plums which have been cultivated in the United States until quite recently belong to this class. They are all of European or Asiatic origin. Except in certain localities they are invaluable. The Myrobolan and Marianna plums, which belong to this group, are largely used for stocks.

V.

The Japanese Plums—Prunus Triflora.

These fruits were imported into the United States about twenty-five years ago, and have grown steadily in popularity. They are generally of large size, brilliantly colored, and excellent in quality. Many seedlings and hybrids from this stock are being introduced. They are not all equally adapted for all sections of the country. Some are not hardy North, some bloom too early, and others do not do so well in the Southern States as farther North.

AMERICAN GROUP—PRUNUS AMERICANUS.

DIVISION I. RED, PURPLE, OR BLUE.

Beach Plum. Small, round; dark purple, covered with bloom; flesh brittle, juicy, sweet, freestone. Grows wild on the sand dunes of the coast from Maine to Virginia. It is a straggling bush, usually three to five feet high. Commonly gathered to preserve. Ripens in August. Flowers ornamental. Fruit of little value. Fig. 705.

Beaty Choice. Large, round-oblong; red, purple; flesh firm, good, cling. Texas.

Cheney.* Large to very large, round-oblong; dull purple red; skin thick; flesh firm, sweet, good, cling. Ripens in August. Wisconsin.

Chippeway. Small, oblong; dark red; skin thick; flesh firm, sweet, free.

Cottrell. Large, round-oblong; red, skin thin; flesh rich, good, cling. Minnesota.

Deep Creek.* Medium, round-oblong, flattened, sutured; dull purple-red, glaucous; skin thick; flesh firm, very sweet, good, free; stalk short. Kansas.

De Soto.* Large to very large, round-oblong, slight suture; red, slight purplish bloom; skin thick; flesh orange color, firm, juicy, good, cling. Late. Wisconsin.

Giant Prune.* Large, oval, not pointed; stem one-half inch long; dark crimson, freestone; flesh dark yellow, sweet and good. Highly recommended as a market fruit. Dries well. Tree vigorous and productive.

Hawkeye. Large, round-oblong; purple-red; skin thick; flesh firm, good, cling. Mid-season. Iowa.

Illinois Ironclad. Large, oblong, dark red; skin thick; flesh firm, cling. Claimed to be one of the best of the native plums. Mid-season. Illinois.

Itaska. Medium, oblong, purple-red; skin thick; flesh firm, cling. Tree dwarf, strong grower, handsome. Minnesota.

Lendlof Green. Small, flattened, oblong; deep red-mottled; skin thick; flesh firm, sweet, good, nearly free. Minnesota.

Louisa. Large, round; dark red; thick skin; flesh firm, good, semi-cling. Varies in appearance in different localities. Missouri.

New Ulm. Very large, round-oblong; dark red; skin moderately thick; flesh firm, good, cling. Early. Minnesota.

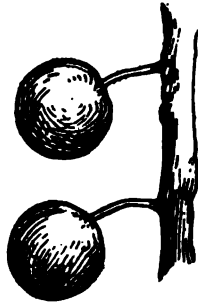


FIG. 705.—Beach Plum.

Peffer Premium. Medium, round, red; skin thick; flesh firm, good, cling. Mid-season. Wisconsin.

Purple Yosemite. Very large, round; red-purple; skin thick; flesh firm, cling. Mid-season.

Quaker.* Very large, round-oblong, flattened; purple-red, orange on side, blue bloom; skin thick, astringent; flesh firm, sweet, juicy, semi-cling, very good. Mid-season. Requires good cultivation and thinning. Iowa.

Rollingstone.* Very large, round, flattened, truncated at ends; mottled and spotted pink-purple; flesh firm, sweet, good, semi-cling. Mid-season. A very popular Western plum. Iowa.

Weaver. Medium, oblong, flattened, dark-red purple bloom, distinct suture, free, good canning plum. Mid-season. Iowa.

Wier. Large red, medium, round, red; skin thin; flesh moderately firm, good for cooking. Illinois.

Wyant. Large, round-oblong; purplish-red; skin thick; flesh firm, free. Iowa.

DIVISION II. GREEN, WHITE, OR YELLOW.

Forest Garden.* Large, round-oblong; orange-yellow, overlaid and dotted red; skin medium, thick; flesh moderately firm, orange color, fibrous, juicy, good, cling; stem slender, short. Tree forked and inclined to split. Not good east of Illinois. Good for home use. August. Illinois.

Gaylord. Large, round-oblong, slightly flattened; orange, mottled red; skin thick; flesh soft, sweet, semi-cling. Mid-season. Iowa.



FIG. 706.—Wolf.

Ida. Medium, round; yellow, covered dull red; flesh firm, salmon color, very sweet, free. Tree sprawling, thorny. Illinois.

Iona. Large, oblong; dull yellow with red cheek; skin thick; flesh firm, yellow, sweet, free. Mid-season. Wisconsin.

Le Duc. Medium, round, flattened; orange, spotted red; skin thin; flesh soft, sweet, semi-cling. Mid-season. Minnesota.

Mussey.* Large, round-oblong; yellow, mottled red; skin thick; flesh firm, good, semi-cling. Very late. Kansas.

Ocheeda. Large, round; yellow and red; skin thin; flesh firm, good, semi-cling. Mid-season. Minnesota.

Speer. Medium, oblong; mottled orange and red; skin medium, thick; flesh firm, sweet, semi-cling. Iowa.

Van Buren. Medium, round-oblong, yellowish-red; skin thick; flesh yellowish, tender, sweet, free. Mid-season. Iowa.

Wolf.* Medium, round; yellow mottled red; skin thick; flesh yellow, firm, fibrous, good, free. Tree strong grower, prolific. Good for home and market. Iowa. Fig. 706.

Yellow Sweet. Medium, round-oblong, flattened; orange mottled pink, purple; skin thin, free. Minnesota.

WILD GOOSE GROUP—PRUNUS HORTULANA.

DIVISION I. RED, PURPLE, OR BLUE.

Forest Rose. Large, round; dark red, with slight bloom; cling. Tree vigorous and productive. Missouri.

Miner.* (Old Hickory, General Jackson, William Dodd, Chickasaw Chief, Hinckley, Isabel, Gillett, Townsend, Robinson, Parsons.) Large, round, pointed apex; dull purple-red, many minute yellow-gray spots; skin thick, blue bloom; flesh pale amber, soft, juicy, vinous, rich, cling; defective fertilizer; fruit should not be gathered until well colored. Late. Tennessee.

Prairie Flower. Medium, roundish, slender stem; dark purple-red, many small yellow specks, slight bloom; flesh yellow amber, juicy, sweet, cling.

Poole. (Poole's Pride.) Medium, round-oblong; red with bloom, sweet, good, hardy, prolific.

Wayland.* Large, round-oblong; light red; skin medium thick and shiny.

Very late, good for Southern States. Kentucky. Fig. 707.

Wild Goose. Medium, round; bright light red; skin thin, shiny; flesh yellow, pulpy, cling, very sweet and juicy when fully ripe. If left to hang on the tree until it drops off it is too soft for shipping. It is advised to pick them three or four days before ripening and ripen in the house. Popular variety, a poor self-fertilizer; should have other plum-trees with abundance of pollen planted near it. Tree like a peach, prolific. Tennessee.



FIG. 707.—Wayland.

DIVISION II. GREEN, WHITE, OR YELLOW.

Garfield. Medium, round-oblong; dark red, yellow specks; skin thick; stem one inch; flesh orange-yellow, juicy, acid. Late. Ohio.

Golden Beauty.* Medium, round-ovate, pointed at apex; deep clear

yellow; skin thick; flesh amber, firm, sweet, semi-cling. Late bloomer, and in ripening. Tree hardy, vigorous, productive, good. Texas.

Missouri Apricot.* Medium, round; deep yellow; skin moderately thick; semi-cling.

CHICKASAW GROUP—PRUNUS ANGUSTIFOLIA.

DIVISION I. RED, PURPLE, OR BLUE.

Brunswick. Medium, round, pointed apex; dark red, white bloom; flesh yellow, sweet.

Emerson Early. Medium, round; purple red; skin thin, cling. Very early, good market sort. Texas.

Hoffman. Medium, round, purple-red. Mid-season. Sure prolific bearer. Ripe in Northern Texas middle of July. Texas.

Newman. (Warren.) Medium, nearly round; pink-red, light spots near apex. October. Kentucky.

Pottawattamie.* Medium, round, red, streaked yellow; stem long, slender; flesh firm, juicy. Very productive. Mid-season. Tennessee.

Robinson. Small, round; red, many light yellow spots; flesh amber, juicy, cling. North Carolina.

DIVISION II. GREEN, WHITE, OR YELLOW.

Wootton. Large, round-oblong; yellow, blotched red. Ripe in Texas in July. Sure bearer. Texas.

Yellow Transparent. Medium, oblong, lemon yellow. Early. Texas.

Priam. Medium, round; yellow, skin thin. Very productive. Texas.

EUROPEAN GROUP—PRUNUS DOMESTICA.

DIVISION I. RED, PURPLE, OR BLUE.

Blue Imperatrice. (Imperatrice.) Size medium, obovate, narrowed to the base in a somewhat conic neck; skin deep purple, bloom copious, blue; stalk three-fourths of an inch long, slightly sunk; flesh greenish-yellow, rather firm, not juicy, rich, sugary; ripening very late, and hanging till nearly winter.

The variety known erroneously as the *Semiana* or *Blue Imperatrice* of Boston, and disseminated as such, differs from the true *Imperatrice* in its shorter and smaller neck, much shorter and not sunk stalk, and more acid flavor. It is very productive, and a good very late culinary sort.

Beauty of Naples. Medium, round, sides uneven; stem half-inch; purple, slight bloom, many yellow specks; flesh yellow amber, tender juicy, sweet, semi-cling. Productive.

Bradshaw.* Very large, obovate, with an obtuse suture on one side, sometimes with a very slight neck; color dark purple, with a light blue bloom; stalk three-fourths of an inch long, cavity narrow; flesh a little coarse, becoming light brownish-purple, at first adhering but becoming nearly free from the stone when fully ripe; juicy, good, slightly acid. Tree vigorous, shoots purple, smooth. Last of August. Fig. 708.

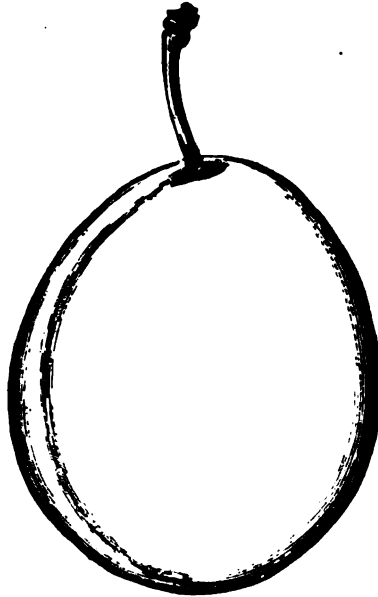


FIG. 708.—Bradshaw.

Brevoort's Purple. (New York Purple.) Large, oval, suture distinct at base; skin reddish, with a violet bloom; stalk three-fourths of an inch long, cavity deep, narrow; flesh soft, juicy, sub-acid, moderately rich, second-rate. Season medium. Shoots long, smooth; tree productive. Origin, New York.

Coe's Late Red, or Red St. Martin. (St. Martin, Saint Martin Rouge.) Size medium, roundish, suture distinct on one side; skin light purplish-red, bloom thin, blue; stalk three-fourths of an inch long, scarcely sunk; flesh rather firm, crisp, rich, vinous. Very late, productive, shoots downy. A valuable late plum. Fig. 709.

Columbia.* (Columbian Gage.) Very large, nearly globular, on side slightly larger; skin brownish-purple, reddish-brown where much shaded, with many fawn-colored dots; bloom blue, copious; stalk one inch long, rather stout; cavity small; flesh orange, moderately juicy, rich, rather coarse, free from the small, compressed stone, or adhering at the edge; flavor good. Fruit liable to rot. Season medium, or end of summer. Shoots downy, stout, blunt, spreading, leaves nearly round.

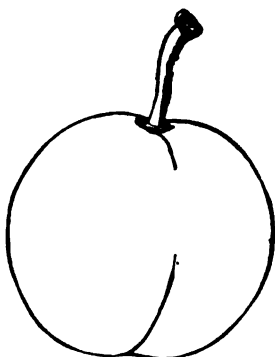


FIG. 709.—Coe's Late Red.

Corse's Nota Bene. Rather large, round; surface pale lilac-brown, often dull green in the shade; bloom light blue, copious; stalk half an inch long, cavity round; flesh greenish, rather firm, crisp, rich, vinous. Very late, very productive, shoots downy.

Cruger's Scarlet. (Cruger's, Cruger's Seedling.) Medium, approaching small, roundish-oval, suture obscure; surface lively red, or bright lilac, with numerous yellow dots, pale fawn color in the shade, bloom thin, bluish; stalk half an inch long, cavity shallow; flesh deep orange, moderately juicy, mild, agreeable, not rich, good. Season medium. Shoots downy. Hardy, adapted to light soils, very productive. Origin, New York.

Damson.* (Common Damson, Early Damson, Purple Damson, Blue Damson.) Small, oval (an inch long), purple bloom thick, blue; melting, juicy, sub-acid, partly free from stone. Early autumn. Profusely productive. The *Sweet Damson* is less acid. The *Winter Damson* is small, round, purple, bloom copious, with an acid, slightly astringent flavor; it bears enormous crops, which hang uninjured till late in autumn. The Damson makes good preserves. There are several sub-varieties.

De Delice. Size medium, roundish-oval, with a slight neck; skin green, marbled and shaded with violet, and covered with a thin bloom; stalk three-fourths of an inch long, rather stout, very slightly inserted; flesh orange-yellow, juicy, melting, with a rich, sugary, luscious flavor, adheres slightly to the stone. End of September, and lasts long. Foreign. (Downing.)

De Montford. Size medium, roundish-oval, dull purple, streaked and dotted with russet; stalk medium, rather stout, not sunk; flesh greenish, juicy, sweet, and rich—adhering to the stone. Last of August.

Denniston's Red. Medium or rather large, roundish-oval, narrowed to the stalk; suture passing half round; surface a fine light red, with fawn-colored dots; bloom very thin; stalk very long, slender, little sunk; flesh amber-colored, rich, of moderate quality, free from the small, oval, compressed stone. Season medium, or last of summer. Shoots smooth. Origin, Albany, N. Y.

Domine Dull. (German Prune, of some.) Size medium, long-oval, suture very obscure; skin very dark purple, bloom blue; stalk three-fourths of an inch long, scarcely sunk; flesh juicy, becoming dry, rich, sweet, good. Profusely productive. Rather late. Origin, Kingston, N. Y.

Duane's Purple.* Very large, oblong-oval, longer on one side, slightly narrowed toward the stalk; skin reddish-purple, bloom lilac; stalk three-fourths of an inch long, slender, cavity narrow; flesh juicy, moderately sweet, of moderate flavor, adhering mostly

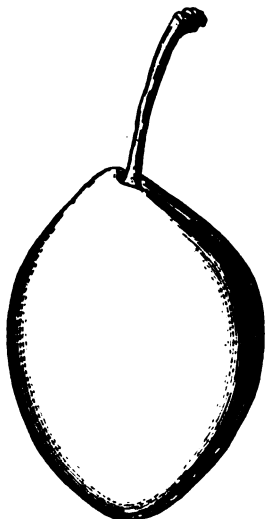


FIG. 710.—Fellenberg.



FIG. 711.—Goliath.

to the stone. Rather early, ripening last half of August. Shoots very downy, leaves large, downy beneath. Origin, Duanesburgh, N. Y.

Early Tours. (Précoce de Tours, Early Violet.) Medium or small; deep purple, bloom copious, blue; stalk half an inch long, cavity narrow; flesh dull yellow, slightly fibrous, rather sweet, melting, good. Quite early. Shoots downy.

Fellenberg.* (Italian Prune.) Medium, oval, pointed and tapering at ends; suture small, distinct; dark purple, with dark-blue bloom; stalk an inch long, scarcely sunk; flesh greenish-yellow, juicy, sweet of good quality—freestone. Last of August. Fig. 710.

Fotheringham. Size medium, obovate, suture distinct; skin purple in the sun, reddish in the shade, bloom pale blue; stalk an inch long; flesh pale greenish-yellow, juicy, sprightly, moderately rich. Rather early. Shoots smooth. English. Old.

Frost Gage. Rather small, round-oval, suture distinct on one side; skin deep purple, bloom thin; stalk half to three-fourths of an inch long, scarcely sunk; flesh juicy, sub-acid, becoming sweet, melting, of fine but not of the highest flavor; much subject to black knot. Shoots smooth, rather slender; tree tall, upright.

German Prune or Quetsche.* Large, long-oval, curved or swollen on one side, with a long tapering neck to the stalk; suture distinct; skin purple, with a thick blue bloom; stalk three-fourths of an inch long, slender, slightly sunk; flesh green, firm, sweet, pleasant, not rich, free from the very long, flat, slightly curved or lunate stone; valuable for drying and preserving. Rather late. Shoots smooth. There are several sub-varieties.

Goliath. Large, roundish-oblong or oval, enlarged on one side; skin deep red, approaching blue or purple; bloom thin, blue; stalk half or three-fourths of an inch long, cavity very deep, distinct; flesh yellowish, mostly adhering to the stone, juicy, coarse, sub-acid. Season medium. Shoots gray, very hairy, leaves narrow. Productive. Bears early—profitable. Fig. 711.

Golden Cherry Plum (Market Plum, of Hoffer) is heart-shaped, yellow, speckled with scarlet in the sun; productive, and slightly earlier than the common cherry plum.

Highlander. Large, ovate, irregular; deep blue with a brownish tinge; stalk very short, slightly sunk; juicy, rich, vinous, refreshing, excellent. End of September.

Howell's Early. Rather small, oval, slightly angular, suture obsolete; skin light brown, often greenish-yellow in the shade; bloom thin, blue; stalk three-fourths of an inch long, slender, not sunk; flesh amber-colored, juicy, sweet, perfumed, free from the small, oval stone. First of August. Shoots slender, gray, downy; tree productive.

Hungarian Prune. Large, long, irregular, oval; purple-black, dense bloom; flesh greenish-yellow, free.

Ickworth Imperatrice. Medium or rather large, obovate; purple, with irregular streaks of fawn color; stalk medium; flesh greenish-yellow, sweet, juicy, rich, mostly adhering to the rather small stone. Very late, keeping into winter, becoming dryer and sweeter. Shoots smooth. English.

Isabella. Medium in size or large, oval, slightly narrowed to the base; skin dark dull red, dotted darker; stalk three-fourths of an inch long, a little hairy, cavity moderate; flesh yellow, rich, juicy, and slightly adhering to the pointed stone. Shoots quite downy. Season medium. English.

Italian Damask. Size medium, nearly round, slightly flattened at base; suture distinct, passing from base to apex; surface violet, becoming brown; stalk half an inch long, slender, cavity small, round; flesh yellowish-green, firm, sweet, high-flavored, very free from the oval, rather thick stone. Season medium. Shoots smooth.

Judson. Rather small, roundish, slightly oval, base a little flattened, suture indistinct; surface a handsome damask or pink, slightly mottled; stalk one inch long, slender, cavity small, rather deep; flesh juicy, rich, vinous, high-flavored, free from the rather large stone. Ripens first of August. Origin, Lansingburgh, N. Y.

Kingston. Large, long, irregular oval, pointed apex; stem stout, three-fourths inch, sutured; nearly black, dense bloom; flesh pale yellow, firm flesh, semi-cling.

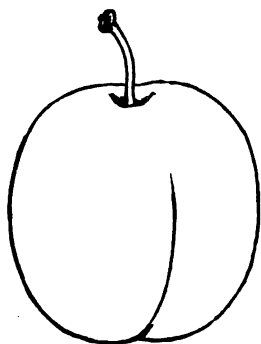


FIG. 712.—Lombard.

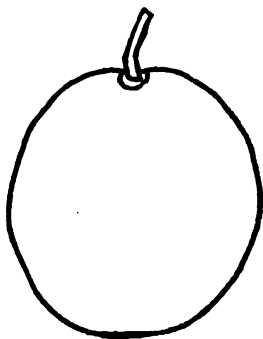


FIG. 713.—Marianna.

Kirke's. Size medium, round, suture small; skin dark purple, bloom thin, blue; stalk three-fourths of an inch long, cavity slight; flesh greenish-yellow, firm, rich, free from the flat, broad stone. Season medium. Shoots smooth. Resembles the Purple Gage externally. Often spurious. English.

Lincoln. Large, oval, flattened at apex; red purple, slight bloom; flesh amber, juicy, sweet, free. Very prolific.

Lombard.* (Bleecker's Scarlet.) Size medium, sometimes rather large, round-oval, slightly flattened at ends, suture obscure; skin violet-red; stalk very slender, half to three-fourths of an inch long, cavity broad; flesh deep yellow, pleasant, not rich, but of fine quality. Rather early or medium in season, ripening a week or two before the end of August. Hardy, very prolific, well adapted to light soils—valuable. Shoots thrifty, quite smooth or glossy, bright purple; leaves crumpled. Origin, Albany, N. Y. This is a strongly fixed variety, and has in many instances produced seedlings very closely resembling itself. Fig. 712.

Manning's Long Blue. (Large Long Blue, Manning's Long Blue Prune.) Large, long, oval, slightly one-sided, suture obscure; stalk very long, slender, scarcely sunk; skin dark purple, bloom

round, slightly narrower toward the base, or approaching obovate; suture distinct on one side at apex; skin reddish-purple, bloom very thick; stalk three-fourths of an inch long, cavity narrow; flesh dull yellow, rather firm, melting, juicy, rich, of excellent

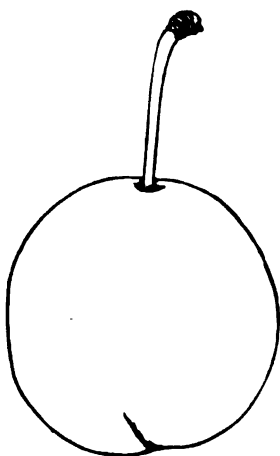


FIG. 721.—Royale.

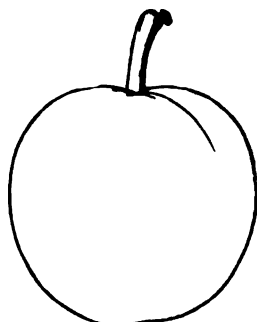


FIG. 722.—Early Royal.

flavor. Ripens first of September. Shoots very downy, growth slow, tree spreading, moderately productive. French. Fig. 721.

Royale Hative, or "Early Royal."* (Mirian.) Size medium, roundish, slightly wider at base; skin light purple, stalk half an

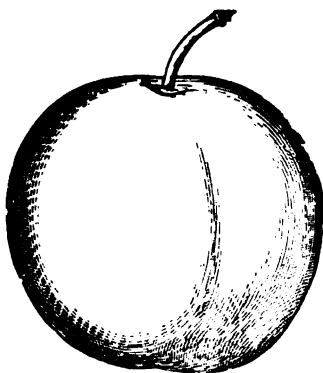


FIG. 723.—Royal Tours.

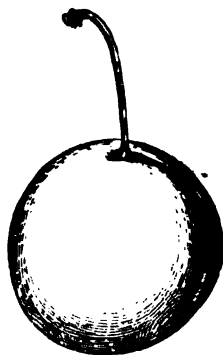


FIG. 724.—Schenectady Catherine.

inch long, stout, scarcely sunk; flesh amber yellow, with a rich, high flavor, nearly free from the small, flattened, ovate stone.

Very early. Resembles Purple Gage, but a month earlier. Shoots very downy. French. Rare. Fig. 722.

Royal Tours.* (Royale de Tours.) Large, roundish, suture deep, half round, one side swollen; a white depressed point at apex; skin red in the shade, deep violet in the sun, bloom copious, blue; stalk half to three-fourths of an inch long, cavity narrow; flesh greenish-white, rather firm, juicy, rich, high-flavored, adhering closely to the large, oval, flattened stone. Quite early; shoots quite downy. Valuable for its earliness and good quality. The genuine sort is very rare. French. Fig. 723.

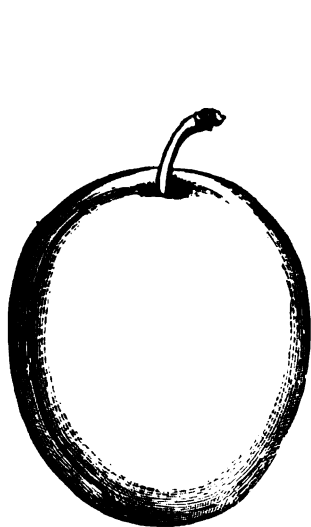


FIG. 725.—Sharp's Emperor.

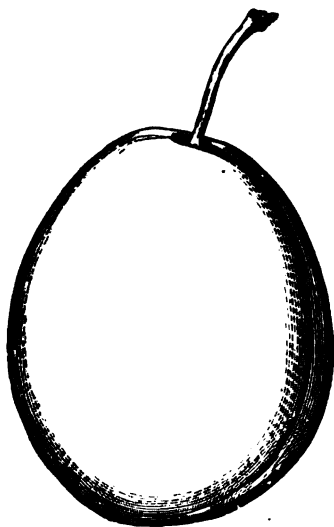


FIG. 726.—Victoria.

Schenectady Catherine.* Size small or nearly medium, roundish, slightly narrowed to the apex; suture rather shallow; skin deep purple-violet in the shade, slightly netted on the sunny side; stalk three-fourths of an inch long, slender; cavity deep, narrow; flesh greenish-yellow, melting, sweet, rich, excellent, next to the Green Gage in quality, ripening last of August. Shoots rather slender, smooth. Tree extremely hardy, productive, and reliable. Fig. 724.

This is quite a distinct variety, often reproducing itself from seed not perceptibly varying from the parent.

Sharp's Emperor. Quite large, roundish-oval; skin a bright red, paler in the shade, bloom delicate; flesh deep yellow, pleasant, moderately rich. Very productive. Shoots strong, downy, leaves large. English. Showy. One of the best market sorts. Fig. 725.

Smith's Orleans.* Large, oval, slightly wider at base, a little irregular, suture deep on one side; skin reddish-purple, becoming very dark, bloom deep blue; stalk small, slender; cavity narrow, deep; flesh deep yellow, slightly firm, juicy, rich. Shoots vigorous, straight, glossy reddish-purple; leaves dark green, crimped. Ripens the last week of August. Productive in nearly all soils. Long Island.

Suisse. (Prune Suisse, Swiss Plum, Simiana, Monsieur Tardif.) Medium or rather large, round, suture broad, shallow; a sunk point at apex; skin lively violet red, thickly dotted, and slightly

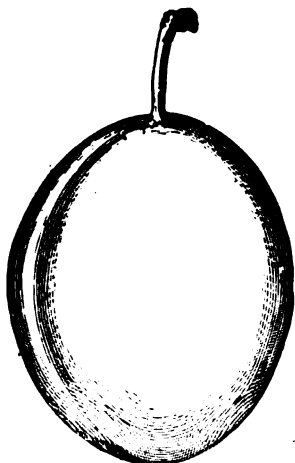


FIG. 727.—Wangenheim.



FIG. 728.—York State.

marbled; bloom blue, copious; stalk three-fourths to an inch long, cavity wide; flesh crackling and melting, flavor brisk, rich, slightly sharp, adhering to the thick, rough-edged stone. Quite late. Shoots smooth. Distinct from the "Semiana," of Boston.

Thomas. Large, round-oval, slightly irregular, somewhat compressed on the suture; skin salmon color, with a soft red cheek and numerous dots; stalk hairy, one-half to three-fourths of an inch long, stout; cavity small, narrow; flesh pale yellow, somewhat coarse, mild, pleasant, free from the very light-colored stone. Shoots slightly downy. Productive. Season medium. Origin, Boston.

Victoria. Large, obovate, suture distinct; color a fine light reddish-purple; stem half an inch long, cavity rather deep and narrow; flesh yellow, pleasant—clingstone. It has been long known in some parts of England—stands next to Pond's Seedling in size,

beauty, and productiveness. A great grower, irregular. Distinct from and better than Sharp's Emperor. Fig. 726.

Wangenheim. Medium, oval, suture shallow but distinct, dark blue, stem short, set without depression; flesh greenish-yellow, juicy, firm, sweet, rich, "very good," partly free from the rather large stone. German, a sort of prune. Growth erect, moderately vigorous, tree very productive. One of the best of its class. Fig. 727.

Wax. Large, slightly oval; rich yellow, mostly covered with red bloom lilac; stalk long; flesh greenish-yellow, juicy, sprightly, freestone. October. Albany, N. Y.

York State Prune.* Large, oval, sutured at apex, dark blue, light bloom, firm, juicy, free. Vigorous, productive; a good market plum. New York. Fig. 728.

DIVISION III. GREEN, WHITE OR YELLOW.

Albany Beauty. (Denniston's Albany Beauty.) Size medium or rather small, roundish-oval, with a slight neck at base, suture obscure; surface pale whitish-green, purple dots numerous, bloom thin; stalk an inch or more long, slender, scarcely sunk; flesh yellow, moderately juicy, rich, sweet, free from the small, pointed stone. Ripens the last week in August. Shoots lightly downy. Origin, Albany, N. Y.

Apricot. (French Apricot.) Size medium or rather large, roundish, suture deep; stalk scarcely half an inch long; surface yellow, dotted and tinged with red in the sun; bloom white; flesh yellow rather firm, slightly bitter, becoming, when ripe, melting, juicy, and pleasant. Rather early. Shoots quite downy.

The English Apricot plum is a third-rate, clingstone, oval fruit, with smooth shoots.

Autumn Gage. (Roe's Autumn Gage.) Size medium, ovate, slightly conical; stalk three-fourths of an inch long, not sunk; surface pale yellow, bloom thin, whitish; flesh greenish-yellow, juicy, sweet, delicate, pleasant, free from the long, pointed, compressed stone. Leaves pointed, shoots smooth, spreading. Ripens rather late. Growth very slow. Very productive. Origin, Newburgh, N. Y.

Bleecker's Gage.* Size medium; roundish-oval, regular, suture obscure; stalk an inch long, rather stout, downy, slightly sunk;

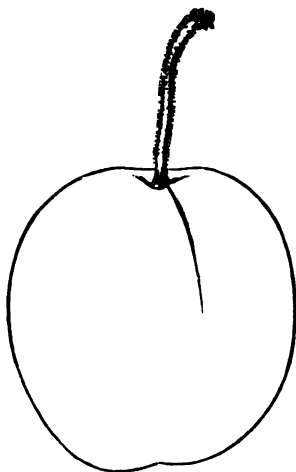


FIG. 729.—Bleecker's Gage.

skin yellow, with sunken white specks; bloom thin, white; flesh yellow, rich, sweet, luscious, partly free from the pointed stone. Ripens at the end of summer. Shoots downy. Distinguished from Prince's Yellow Gage by its larger stalk and later maturity. Origin, Albany, N. Y. Fig. 729.

Bingham. Large (an inch and three-fourths long), oval, rather widest at base; surface deep yellow, with rich red spots to the sun; stalk slightly sunk; flesh yellow, juicy, rich, delicious. Season of ripening medium, or end of summer and first of autumn. Shoots downy. Handsome, productive, and valuable. Origin, Pennsylvania.

Buel's Favorite. Rather large, ovate, broadest at base; suture distinct half round; stalk two-thirds of an inch long, rather stout, little sunk; surface pale green, thickly sprinkled with lighter dots, base with reddish specks; flesh greenish-yellow, rather firm, juicy, rich, high-flavored, adhering to the long pointed stone. Ripens at the close of summer. Shoots smooth, reddish. Origin, Albany, N. Y.

Coe's Golden Drop.* Very large (often more than two inches long), oval, suture distinct, one side more enlarged, necked; light yellow, often dotted red to the sun; stalk three-fourths of an inch long, rather stiff; flesh yellowish, rather firm, rich, sweet, not fine-grained, closely adhering to the pointed stone. Quite late, does not always ripen at the North—requires a long season. An excellent late sort, of English origin. Shoots smooth, rather glossy.

Dana's Yellow Gage. Size medium, oval; pale yellow, marbled with darker green, bloom very thin; flesh juicy, lively. Season medium. Very productive. Hardy. Massachusetts.

De Caradenc. Medium, round; yellow with dark red or brown cheek; well-marked suture; skin thin; flesh very juicy, sweet, cling. Early. A seedling of *Prunus domestica*, claimed by some to be a hybrid with Chickasaw. Originating in South Carolina.

Denniston's Superb. Size medium, round, obscurely oval, slightly flattened, suture distinct; surface pale yellowish green, slightly dotted and clouded with purple, bloom thin; stalk rough, three-fourths of an inch long, moderately sunk; flesh thick (stone small), not juicy, rich, vinous, free from the thick, roundish stone. Ripens rather early, or last fortnight of summer. Resembles Green Gage, rather earlier, and not so good. Shoots downy. Very productive. Origin, Albany, N. Y. One of the handsomest of plums.

Downton Imperatrice. Size medium, oval, base tapered or with a neck; skin thin, pale yellow; flesh yellow, melting, acid, becoming rather sweet. Ripens late, or end of September. Shoots smooth, long, strong, upright. For preserving. A cross of the White Egg and Blue Imperatrice.

Drap d'Or. (Yellow Perdrigon, Mirabelle Grosse.) Rather small, round, suture indistinct, apex dimpled; stalk half an inch long, slender; surface golden yellow, sometimes a few crimson dots to the sun; flesh yellow, sweet, rich, often half dry, partly adhering

to the stone; ripens a week before the Green Gage. Shoots slightly downy, growth slow.

Drap d'Or of Esperin. Large, roundish-oval; golden yellow; stalk short, stout, little sunk; flesh yellowish, rather coarse, juicy, sweet, rich—freestone. Last of August.

Early Yellow Prune. Rather large, oval; yellow, dotted red; stalk medium, slightly sunk; sweet, juicy, slightly melon-flavor—freestone. Middle of August. Great bearer.

Fulton. Medium, oval approaching ovate; suture distinct; bright yellow; stalk and cavity medium; flesh yellow, juicy, with a rich, high flavor. October. Tree vigorous, productive, fruit hangs long. Fig. 730.

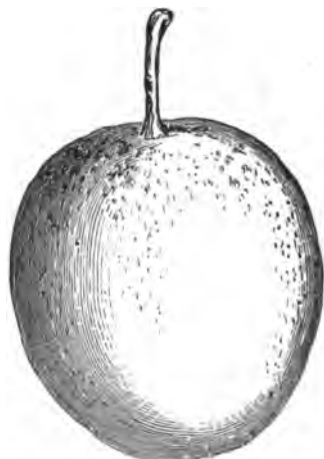


FIG. 730.—Fulton.

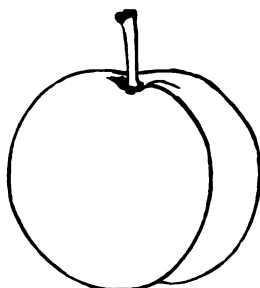


FIG. 731.—Green Gage.

General Hand. Very large, roundish-oval; skin deep golden yellow; stalk long; flesh moderately juicy, not high-flavored—freestone. Shoots nearly smooth. First of September.

Green Gage.* (Reine Claude, Bruyn Gage.) Rather small, round; suture faint; surface green, becoming yellowish-green, usually with reddish-brown dots and network at base; stalk half to three-fourths of an inch long, scarcely sunk; flesh pale green, melting, juicy, exceedingly sweet and rich, and unequalled in flavor. Ripens about the middle of August. Shoots smooth, buds with large shoulders, growth slow, and young trees difficult to raise in most localities. French. Old. There are many seedlings, inferior to the original, and many worthless green plums called by this name. Fig. 731.

Henry Clay. Medium, oval, suture slight, yellow, marbled and shaded red; stalk long, slender, scarcely sunk; juicy, sweet;

stone small, nearly full. End of August. A handsome and productive variety. Albany, N. Y.

Howard's Favorite. Large, necked, rich yellow, dotted and shaded with carmine, bloom lilac; stalk long, inserted in a ring; flesh rather coarse, but very sugary, rich, and delicious—somewhat adherent to the stone. September. Tree vigorous, fruit hangs long. Albany, N. Y.

Hudson Gage. Size medium; oval, suture obscure, one side slightly larger; surface yellow, clouded or streaked faint green, bloom thin, white; stalk about two-thirds of an inch long, moderately

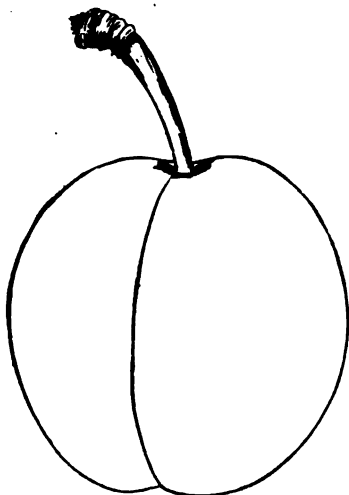


FIG. 732.—Huling's Superb.

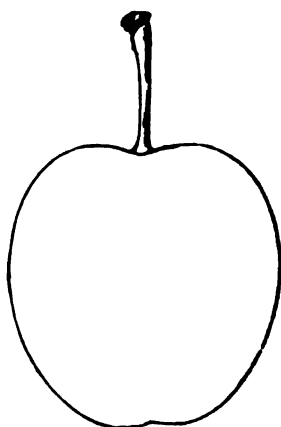


FIG. 733.—Imperial Gage.

sunk; flesh greenish, juicy, melting, rich, sprightly, excellent, nearly free from the small stone. Ripens two weeks earlier than Washington, and three weeks before Imperial Gage, which it partly resembles. Origin, Hudson, N. Y.

Huling's Superb.* Large, round-ovate, suture shallow, indistinct; stalk one inch long, stout, slightly sunk; skin dull greenish-yellow; bloom pale, thin; flesh rather firm; flavor rich, brisk, excellent. Ripens latter part of summer. Shoots thick, vigorous, downy, leaves very large. A moderate bearer. Origin, Pennsylvania. Fig. 732.

Imperial Gage.* (Flushing Gage, Prince's Imperial Gage, White Gage, of Boston.) Fruit rather large, oval, suture distinct; stalk three-fourths of an inch long, slightly hairy, evenly sunk; surface green, slightly tinged yellow, with marbled green stripes; bloom copious, white; flesh greenish, juicy, melting, rich, sometimes adhering, but usually nearly free from the oval, pointed stone.

Ripens first of autumn. Very productive. Shoots long, upright, vigorous, slightly downy; leaves with a slight shade of blue. Fig. 733.

Imperial Ottoman. Nearly medium in size, oval, suture on one side halfway from base to apex; somewhat pellucid; surface pale greenish-yellow, marbled; stalk three-fourths of an inch long, downy, slender, curved, scarcely sunk; surface dull yellow, clouded darker, bloom thin; flesh very juicy, sweet, excellent, scarcely adhering to the pointed stone. Ripens first of August. Great bearer. Shoots slightly downy; tree hardy, succeeds well as far north as Maine. Fig. 734.



FIG. 734.—Imperial Ottoman.

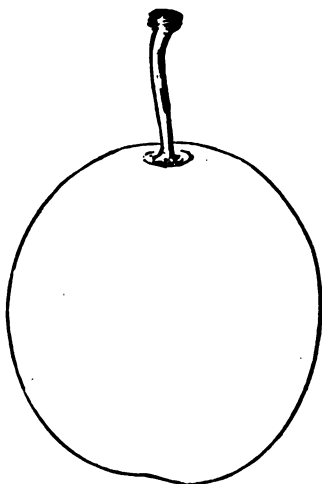


FIG. 735.—Jefferson.

Ives' Seedling. Large, ovate, suture distinct; yellow, mottled and dotted red, bloom thin; stalk short, slightly sunk; flesh rich amber color, juicy, high flavored—freestone. First of September. Growth moderate, buds prominent. Massachusetts.

Jefferson. Large, oval, base slightly narrowed, suture slight; greenish-yellow, becoming golden yellow, often faintly reddened to the sun, bloom thin, white; stalk an inch long, sunk little or none; flesh rich yellow, moderately fine grained, in well-ripened specimens orange; very juicy, nearly free from the long, pointed stone; flavor rich, luscious, excellent. Ripens end of summer. Origin, Albany. Shoots smooth. Fig. 735.

Lawrence's Favorite.* (Lawrence Gage.) Large, roundish, slightly oblong-oval, obtuse; surface dull yellowish-green, clouded darker, bloom light bluish-green; base, when ripe, with a brownish-red network and dots; stalk half an inch long, small, cavity narrow; flesh greenish, melting, juicy, rich, excellent. Shoots

short, rather upright, downy leaves small, dark green. Rather early or middle of August. Origin, Hudson, N. Y. Fig. 736.

Lucombe's Nonsuch. Medium or rather large, roundish; skin yellowish-green with yellowish-orange, bloom whitish; suture broad; stalk three-fourths of an inch long, cavity wide; flesh rather firm, rich, sweet, with acid. Fig. 737.

Madison. Size medium, roundish, suture shallow; rich yellow, dotted and shaded crimson next the sun; stalk short, stout, little sunk; flesh rich yellow, slightly coarse, with a rich flavor, adheres

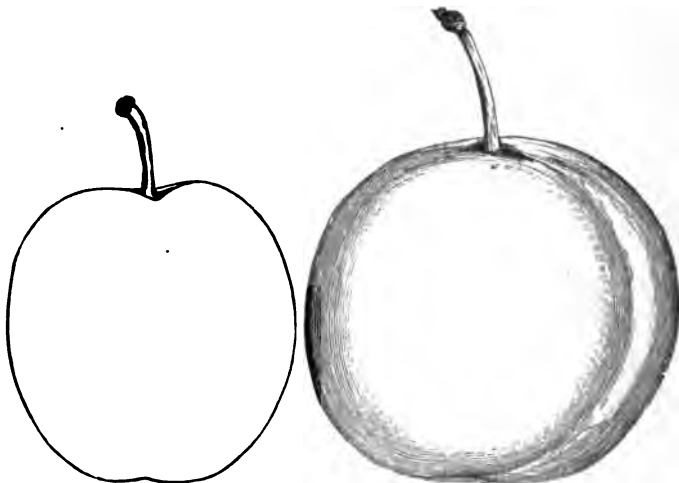


FIG. 736.—Lawrence's Favorite.

FIG. 737.—Lucombe's Nonsuch.

slightly to the stone. End of September. Shoots smooth, tree vigorous, productive. Albany, N. Y. Closely resembles Denniston's Superb.

McLaughlin.* Rather large, roundish-oblate, much flattened at ends, suture obscure; stalk three-fourths of an inch long, scarcely sunk; skin thin, tender, russet-yellow, sprinkled with thin red, purplish at base; flesh rather firm, juicy, sweet, luscious. Stone clings. Ripens at the end of summer. Growth vigorous, leaves large, glossy, shoots smooth. Origin, Bangor, Me. Fig. 738.

Mirabelle. Very large, obovate, suture distinct; stalk half an inch long, slightly sunk; surface a fine yellow, slightly spotted with red, bloom white; flesh orange, sprightly, becoming dry. Ripens with the Green Gage. Shoots downy, tree small. A small, beautiful, second-rate plum, very productive, and valued for preserving. Its seedlings are used as stocks for dwarf plums.

Moldavka. Medium, oval, pointed apex; light yellow, thick bloom; flesh orange, rich, semi-cling. Russian.

Monroe.* Full medium, roundish-oval; greenish-yellow; stalk rather long, slightly sunk; flavor rich, and good. First of September. Tree a healthy, strong grower, and great bearer. Monroe County, N. Y.

Mulberry. Large, oval, tapering, with a neck to the stalk, suture slight; pale dull yellow, with a few crimson dots; bloom thin; stalk an inch long, slender, scarcely sunk on the obtuse end of the neck; flesh greenish-yellow, rather coarse, melting, rich, adhering to the large, oblong, pointed stone. Ripens the first of autumn. Shoots stout. Origin, Albany, N. Y.

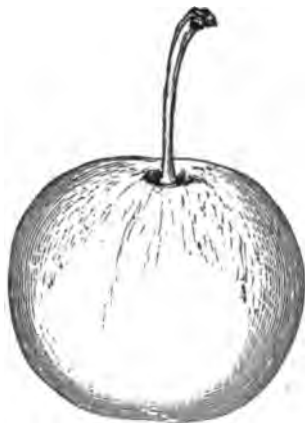


FIG. 738.—McLaughlin.

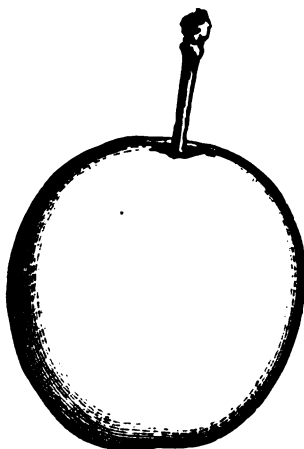


FIG. 739.—Nelson's Victory.

Nelson's Victory. Size medium, roundish-oval; brownish-yellow, with some dull red; stone small; flesh free, juicy, good. Tree vigorous, great bearer, fruit showy, fine for market. English. Fig. 739.

Orange. Very large, oval, flattened at ends; bronze-yellow, rough, marked with purplish-red near the base; stalk three-fourths of an inch long, cavity narrow; rather coarse, acid. End of August.

Parsonage. Rather large, oval, pale yellow, stalk medium, slightly sunk; flesh yellow, juicy, with a rich, sugary flavor. Free from the stone. First of September. Tree vigorous, upright, productive. New. Dutchess County, N. Y. (Downing.)

Peters' Yellow Gage. Large, nearly oval, varying in its form; rich yellow, crimson dots next the sun; stalk three-fourths of an inch long, set in a deep cavity on one side of the plum; suture distinct, dividing the fruit unequally; flesh greenish-yellow, rich, sweet, very good. Fig. 740.

Précoce de Bergthold. Small, roundish-oval; yellow; juicy, sweet. Very early, middle of July.

Primordian. (Jaune Hâtive or Early Yellow, White Primordian.) Small, obovate, necked; suture small; stalk slender, downy, half an inch long; pale clear yellow, bloom thin; flesh yellowish, moderately juicy, with a rather sweet, mild, good flavor; very free

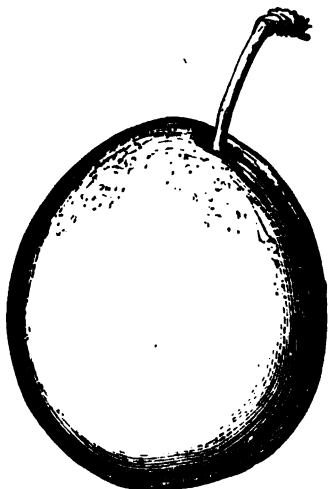


FIG. 740.—Peters' Yellow Gage.

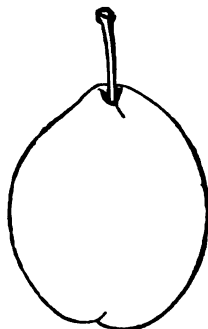


FIG. 741.—Primordian.

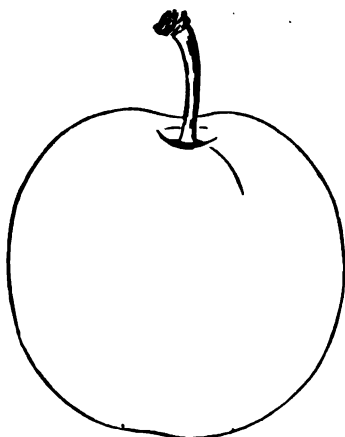


FIG. 742.—Washington.

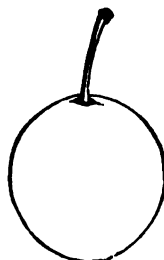


FIG. 743.—White or Yellow Damson.

from the stone. Middle of July. Shoots quite slender, very downy, growth slow. Valuable only for its extreme earliness. Fig. 741.

Reine Claude de Bavay.* Round-oval; greenish-yellow, spotted with red, with small, violet-colored, longitudinal veins; flesh rather firm, juicy, sugary, rich, of fine quality, adhering slightly to the stone. Shoots smooth; leaves roundish, shining—the growth resembling Washington, but leaves smaller and shoots slenderer. Very productive.

Schuyler Gage. Size medium, oval, suture moderate; yellow with green splashes, dotted and shaded with red next the sun; stalk long, curved, slightly sunk; flesh yellow, juicy, sweet, excellent. Resembling Green Gage—free from the stone. Last of September. Tree vigorous, productive. Albany, N. Y.

St. Catherine. Size medium, obovate, suture very distinct, passing half round; skin pale yellow, sometimes slightly reddish to the sun, bloom thin, white; stalk three-fourths of an inch long, very slender, slightly sunk; flesh juicy, rather firm, rich, fine. Ripens rather late. Shoots smooth, rather slender.

St. Martin's Quetsche.* Size medium, ovate, broadest at base; surface pale yellow, often spotted with brown, bloom white; flesh yellowish, very juicy, rich, excellent. Ripens at mid-autumn and keeps long. Shoots smooth. A profuse bearer. One of the best late plums. Profitable. German. Too late for the far North.

Washington.* (Bolmar, Bolmar's Washington.) Large, often very large, roundish-oval, suture obscure, distinct at base; surface yellowish-green faintly marbled, often with a pale red blush; stalk one-half to three-fourths of an inch long, slightly downy; cavity wide, shallow; flesh rather firm, sweet, mild, moderately rich, free from the pointed stone. Rather early, last half of August. Shoots downy, very vigorous, leaves very large. Origin, New York city. Fig. 742.

White or Yellow Damson. (Late Yellow Damson.) Small (one inch long), oval, pale yellow, dotted with reddish-brown; stalk half an inch long, downy, not sunk; flesh rich, sub-acid, agreeable; ripens very late, hanging long on the tree. Shoots smooth, growth free. Tree very productive. Fig. 743.

White Egg. (White Magnum Bonum, White Imperial.) Very large, oval, narrow at ends, necked at base, suture distinct, stalk an inch long, not sunk, surrounded by a fleshy ring at insertion; skin light yellow, bloom thin, white; flesh firm, coarse, acid, becoming sweeter by ripening, adhering closely to the long, pointed stone. Ripens about the end of August. Culinary.

The Yellow Egg is very similar in character, but the flesh partly separates from the stone when fully ripe. There appear to be several sub-varieties.

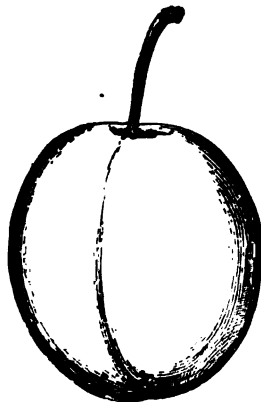


FIG. 744.—Yellow Gage, Prince's.

T. Rivers, of Sawbridgeworth, England, says the *Yellow Magnum Bonum* is an American plum of extreme hardiness—good, but not first-rate—flesh clings—and bears more freely than “our old White Magnum Bonum.”

Yellow Gage; English. (Little Queen Claude.) Small, round, suture on one side distinct; surface pale yellowish-green, becoming yellow, with a few reddish dots, bloom dense; stalk half an inch long, slender, slightly sunk; flesh very sweet, pleasant, quite free from the stone. Ripens nearly with the Green Gage. Shoots long, smooth. Of French origin.

Yellow Gage, Prince's.* (American Yellow Gage.) Size medium; oval, slightly broadest at base; suture a mere line; surface golden yellow, slightly clouded; bloom white, copious; stalk an inch long, cavity small, round; flesh deep yellow, rich, sugary, melting, sometimes rather dry. Ripens early in August. Shoots smooth, short-jointed, leaves glossy, tree becoming spreading. Origin, Flushing, L. I. Fig. 744.

JAPANESE GROUP—PRUNUS TRIFLORA.

DIVISION I. RED, PURPLE, OR BLUE.

Bailey. Large, nearly round; orange, overlaid bright cherry-red, numerous small orange dots; flesh, yellow, firm, melting, cling.

Berger. (Shiro-Smomo.) Small, globular, bright red; flesh firm, yellow, sweet, free.

Chabot. Medium, oblong-conical; yellow, covered light red, numerous small, yellow dots; flesh orange-yellow, juicy, acid, cling, productive. September; good for cooking and drying. Fig. 745.



FIG. 745.—Chabot.

Delaware. Medium, round-conical; bronzy-purple with white bloom; flesh purplish-red, juicy, spicy. Productive.

Excelsior. Medium, dark red, blue bloom; flesh greenish-yellow, sub-acid, cling. A cross of Kelsey and Wild Goose.

Hale. (Burbank No. 3, Prolific.) Medium, globular; light orange-red; flesh yellow, firm, spicy, sweet; cling. Very late.

Maru. Medium, round, slightly pointed; yellowish-red; flesh, yellow, melting, juicy, sub-acid, free.

Munson. (Hytan, Kayo, Douglas.) Medium, oblong; pale red;

skin thin, tough; flesh yellow, melting, acid. Free, hardy, and productive; good South.

Red Nagate. (Red June, Shiro-Smomo.) Medium, long-conical, distinct suture; dark purple-red; flesh yellow, firm, good, cling. Very early; handsome and productive. Fig. 747.



FIG. 746.—Chase.



FIG. 747.—Red June.

Satsuma.* (Blood, Yonemomo). Medium, roundish-conical, more or less sharp apex, deep suture; very dark red, blue bloom, greenish dots; flesh blood-red, rather coarse, sub-acid, cling. Blooms early, mid-season; productive.



FIG. 748.—Willard.



FIG. 749.—Abundance.

Shipper. Large, nearly round; light red, white bloom; flesh red, firm, sweet, juicy, semi-cling, long keeper. Seedling of Satsuma.

Simonsi. (*Prunus Simonsi*, Simon's Apricot Plum.) Large, markedly oblate, distinct suture; dark red; flesh orange, firm, peculiar flavor. No value except as an ornamental tree. Chinese.

Wickson. Medium; glowing carmine with heavy white bloom; flesh yellow, firm, spicy, sub-acid, cling, good. Ships well. A cross by Burbank of Kelsey & Burbank.

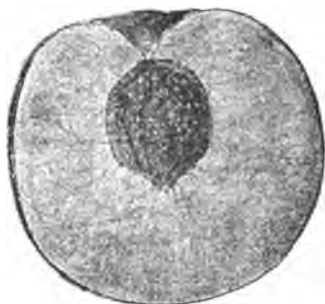


FIG. 750..



FIG. 751.

Babcock.

Willard.* (Botan No. 26.) Medium, roundish; dark red, numerous small yellow dots; flesh yellow, sweet, free. Productive, very early. Fig. 748.

Yosete. (Earliest of All.) Small, conical, distinct suture; dark purple-red; flesh yellow, free.

DIVISION II. GREEN, WHITE, OR YELLOW.

Abundance.* (Yellow-Fleshed Botan.) Medium to large, round, usually with pointed apex; orange-yellow, splashed and dotted red; flesh deep yellow, very juicy, sub-acid, cling. Mid-season. Fig. 749.

Babcock. (Botankio, Botan.) Medium, round, conical; yellow, overlaid; red skin thick; flesh orange, firm, sweet good, cling. Late. Figs. 750 and 751.

Berckmans.* (Sweet Botan, True Sweet Botan, White-Fleshed Botan, Botan.) Medium, roundish-conical; green, covered dark purple; flesh yellowish, juicy, very sweet, semi-cling.

Burbank. Medium, round-conical, apex blunt; orange yellow, overlaid red, numerous yellow dots; flesh yellow, firm, sweet, rich, cling. Resembles Abundance, but larger and better. Fig. 752.

Georgeson. (Hattonkin No. 1.) Medium, oblong-conical; bright golden yellow; flesh yellow, sweet, cling. Very early. Fig. 753.

Kelsey.* Very large, two to three inches diameter, heart-shaped, lop-sided, distinct suture; yellow, overlaid bright red-purple, dotted; flesh light yellow, firm, rich, free, usually hollow. Not hardy North. A good canning fruit.

Kerr. (Hattonkin No. 2.) Medium, conical, sutured; bright yellow; flesh yellow, juicy, sub-acid, cling. Prolific. Probably not hardy North.



FIG. 752.—Burbank.



FIG. 753.—Georgeson.

Normand. (Normand Yellow, Normand Japan.) Medium, conical, heart-shaped; golden yellow; flesh yellow, firm and good, free.

Ogon.* (Oyon, Shiro-Smomo, White Plum.) Medium, roundish, oblate, distinct suture; golden yellow, with creamy bloom; flesh thick, firm, not juicy, free. Keeps long, good canner. Mid-season.

CHAPTER XXXI.

THE QUINCE.

THE quince, a small, irregular growing tree, about ten or twelve feet high, bears one of the best fruits for preserves and jellies, and for giving additional flavor to apple cooked in any manner. It is usually propagated by layers and cuttings. Propagation by layers is performed by bending young shoots



FIG. 754.—Neglected Quince-Tree.

down in spring, and burying them so as to leave a few buds at the extremity above ground, as described on page 26 of this work. When the buds on the shoots have well started, all are rubbed off or cut away but the best. They will throw out roots by autumn, and may be removed from the parent tree, and set out in rows; those which do not root the first year may be left till the second. If the ground is rich, and they are kept well-cultivated and straightened by stakes, the cuttings and layers will produce

trees fit for removal as standards in two or three years. This mode is more commonly used in raising the orange quince as a fruit. In the extensive propagation of stocks for the pear, layering by stools is adopted. They are made by cutting back strong plants to within a few inches of the surface of the ground early in spring, or before the buds swell, which induces them to throw up a number of strong shoots, constituting the stools. These are earthed up

the following spring, so that the whole of the stem and the base of all the shoots will be covered three or four inches deep. Roots will be thrown out during the same season, and these rooted shoots are separated from the plant in the autumn for transplanting in rows. The stools are well cultivated and dressed with manure the following season, and will produce another crop of shoots the second year. As each stool yields a crop in alternate seasons, there should be two sets, so that an annual supply may be obtained.

The quince is extensively propagated by cuttings, both in raising stocks and trees for fruiting. The details of the operation are described on pages 24 and 25 of this work.

The *soil* for the quince should be deep and rich, such as will raise good corn and potatoes, and should be kept well cultivated. An application of good manure should be made every year or two, and a thin sprinkling of salt over the surface in spring has often been found beneficial.

Directions for pruning young quince-trees will be found on page 106.

The total neglect of the cultivation of the quince by many who have planted out the trees has resulted in their dwarfish and stunted growth and entire unproductiveness. To renovate such trees, cut or saw out the thick profusion of suckers which surround the stem (Fig. 755), deepen the soil with the spade as much as the roots will



FIG. 756.—Well-Pruned Quince-Tree.



FIG. 755.—Untrimmed Quince Bush.

admit, and apply a large barrow-load of compost to each tree, made by a thorough intermixture, some weeks previously, of stable manure and black mud, or other compost, and then spread a thin coating of salt upon the surface. This

should be done in the spring of the year. The pruning may be such as to remove the suckers, and reduce the number of stems to three or four, or the tree may be trimmed to one clean stem, as shown in Fig. 756. The fruit will be greatly improved by the operation. Fig. 755 shows a common appearance of a neglected tree.

In planting quince orchards, the distance asunder may be about ten or twelve feet, which will be found near enough for full-grown trees, on a deep, rich, and well-treated soil. If the ground is previously subsoiled, and well manured by trench-ploughing, the young trees will come into bearing in about three years, and continue productive, if well managed, for forty years or more.

VARIETIES.

Alaska. Large, pyriform, hardy, productive, bears early.

Angers Quince. This variety is cultivated as stock for the pear. The fruit is pear-shaped, golden yellow. It is later and a little harder in texture than the Orange Quince. The tree is distinguished by its vigorous growth and large leaves, and it continues growing late in the season.

FIG. 759.—Orange. FIG. 760.—Meech's.

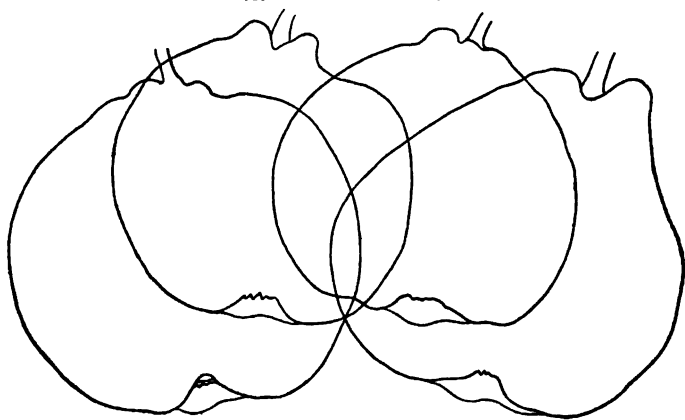


FIG. 757.—Johnson.

FIG. 758.—Champion.

Champion.* Large, obovate-pyriform, bright yellow; flesh tender, delicate flavor. Very prolific, bears young. Keeps well. Fig. 758.

Child's. (California.) Medium, golden yellow, small core.

Chinese. Very large, oblong, rather coarse. Tree a vigorous grower, but late bearer. Does best South.

Fuller's. Large, pyriform, usually with an abrupt small neck; surface irregular; lemon-yellow; basin wide and deep; flesh tender and good.

Fontenay or Paris Quince. This is also cultivated extensively as stock for the pear. The fruit is not equal in quality to the Orange or Angers, more nearly resembling the Pear Quince in form and texture. The tree has more small side-shoots, grows thicker, and is less vigorous than the Angers. The Angers is further distinguished from the Fontenay by its downy shoots when young, darker wood, and short stout thorns.

The Japan and Chinese quinces are cultivated merely as ornamental shrubs. The fruit, which sets freely, is of no value for edible purposes, and as it has a highly aromatic fragrance is sometimes used to perfume clothes-drawers.

Johnson's.* Large, roundish-oblate, compressed at stem; greenish-yellow, downy in depression; dots small, green; cavity broad, nearly level; basin large, angular, deep; flesh yellowish, juicy, mild. Very good. Pennsylvania. Fig. 757.

Meech's.* (Meech's Prolific.) Large, obscure-pyriform, golden yellow; very fragrant, good flavor. Bears early—very productive. An excellent variety. Fig. 760.

Orange or Apple Quince.* Large, some sub-varieties quite large, roundish, somewhat irregular, with a small and very short neck at the base; surface of a fine golden color; flesh firm, stewing rather tender, of excellent flavor. Ripens soon after mid-autumn. Leaves oval. Tree productive if well cultivated. Fig. 759.

This is the most common sort, and by continual propagation of seedlings several sub-varieties have been produced, varying slightly in coarseness or firmness of texture, size and form. The largest sometimes weighs a pound.

Pear Quince. (Oblong or Pyriform Quince.) Size medium or rather large, pyriform, body roundish-oblong, neck about one-half or one-third the length of the body; skin rather dull rich yellow; flesh firm, tough, dry, with a high flavor, stewing less tender than the Orange quince. Ripens late in autumn, and hence adapted to distant marketing. Leaves oblong-ovate. A moderate bearer. Fig. 761.

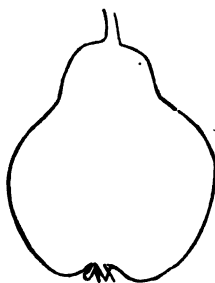


FIG. 761.—Pear Quince.

Portugal Quince. Quite large, oblong pyriform, largest at the middle and tapering to each end; yellow; flesh more juicy and less harsh than the other varieties. Stews well, and becomes a fine purple or deep crimson when cooked. The fruit is rather superior in quality, but the value of the variety is much lessened by its unproductiveness. It does not strike readily from cuttings.

Rea's Mammoth.* (Rea's Seedling.) Fruit resembles the Orange, but from one-third to one-half larger, and of excellent quality. Tree a very strong grower, with large dark foliage. Origin, Coxsackie, N. Y.

Van Deman. Above medium, truncated oval, greenish-yellow, sub-acid, prolific, good.

Wist's Mammoth. Very large, round, yellow, fine flavor. A California seedling of the Orange Quince.

CHAPTER XXXII.

THE RASPBERRY.

PROPAGATION.—The varieties which have originated from the foreign species (*Rubus Idaeus*) are increased with great facility by suckers; but plants with better roots may be obtained by planting under glass, with a mild bottom heat, cuttings of the roots an inch or more in length. The American Blackcap and its varieties (*Rubus occidentalis*) are propagated readily by layers, the tips of the recurved branches when slightly buried soon taking root. This layering may be done in August or September, the tips of the shoots having been nipped about midsummer, and when these branch and form tips bare of leaves, bury them in the soil at an angle of forty-five degrees, and they will form fine roots before winter. New varieties are raised from seeds, and come into bearing the second year.

The soil for the raspberry should be rich, and an admixture of swamp muck is useful. A strong, deep loam is the only soil from which a full crop may be expected every season. If sandy or gravelly, or a stiff, cold clay, it cannot be relied upon. But the most important requisite is *depth*, only to be attained by deep ploughing or trenching, which will go far toward affording a remedy for any natural defect of the soil. The more tender varieties may be raised on higher, drier, and firmer spots of ground, where they are less liable to severe frosts.

The stems of the raspberry are biennial, the canes growing the first season and bearing fruit the second, after which they die, and the new ones take their places. As soon as growth ceases and the leaves drop, the old canes should therefore be cut away. When the new canes have reached a sufficient height the following summer, the tips should be pinched off, to prevent their growing taller, which will cause them to be-

come stout and thick, and to send out side-shoots, which in turn should also be pinched back when they have grown a foot or so in length, being shorter above and longer below. Figs. 762, 763. With the Cap varieties they should not be more than two and a half feet high, which will obviate the necessity of staking. The Antwerps may be pinched back at



FIG. 762.—Poor Canes of Cuthbert with high laterals.



FIG. 763.—Good Canes of Cuthbert with low laterals.

three or four feet, but usually this is omitted, in which case they need stakes. The height should vary with the vigor of the plant, strong plants requiring more height. When suckers are numerous they must be cut away when they first appear at the surface, or they will enfeeble the plants. Four or five canes are enough to leave for each stool. The Antwerps and their varieties require the support of staking—which may be effected as shown in Fig. 765, or by means of wires stretched between stakes as in Fig. 776.

In many parts of the Northern States, some tender varieties need winter protection. This is easily given by covering the stems, when prostrate, very thinly with earth; placing a

small mound of earth against the bottom of the stems before laying them down, to bend upon and prevent breaking. This covering is removed early in spring. It will be found to prove very useful even when not necessary to prevent winter-killing, by rendering the crop larger and more certain.

A plantation of raspberries will continue in bearing five or



FIG. 764.—Staked Canes.



FIG. 765.—Wired Canes.

six years, when it should be renewed. If it remain longer, the fruit becomes small, and the crop gradually declines. Nearly the same varieties succeed in the different States of the Union. The foreign or Antwerp raspberries are worthless in most places South.

PLANTING FOR MARKET.

William Parry, who cultivates extensive plantations of the raspberry near Philadelphia, gives the following directions for their management:

“Plough and prepare the ground as for potatoes or other crops; mark the rows six feet apart, and set the plants three feet distant in the rows, requiring about twenty-five hundred plants to the acre. The tops should be cut down to within a few inches of the ground, that the roots may become well established before they are required to supply nourishment for long tops of green foliage. Carrots or potatoes may, with advantage, be grown between the rows the first year, after which the raspberries will require the whole space. Stir the ground frequently with horse and cultivator, to keep down grass and weeds, being careful during the warm, dry weather not to disturb the small roots feeding near the surface, by deep culture near to the plants. The raspberries should be carefully picked in small baskets not larger than pints, better less. Both baskets and crates should be ventilated, so as to allow the circulation of air to absorb the heat and moisture,

as they will bear transportation to market much better when cool and dry."

Good raspberry plantations will yield at the rate of fifty or sixty, and sometimes a hundred, bushels per acre.

PROPAGATING BY SEED,

to produce new varieties, is easily performed by washing the ripe seed from the pulp, mixing with damp sand, and sowing in autumn in fine soil, about half an inch deep, covering till early spring with a moderate coat of leaves or litter. They will produce young plants, which may be taken up and heeled-in late in autumn, and set out the second spring, after cutting down closely. The second and third year they will begin to bear and to exhibit the characteristics of the new sorts.

RULES FOR THE CULTURE OF RASPBERRIES.

1. Any good strong mellow soil, that will raise good corn, and which has been deeply pulverized, will raise good raspberries.

2. Set the plants in rows that will admit of free cultivating, say five or six feet one way and two or three feet the other.

3. For blackcaps, pinch back early, or when the young canes are about two feet high, to keep the bushes snug and compact, and to obviate staking.

4. As the canes grow in one season and bear the next, cut the bearing canes away as soon as they drop their leaves, or never defer the work later than early the succeeding spring.

5. Suckering sorts, to bear well, must have the suckers hoed away when they first appear above ground, or be treated like weeds.

6. Increase the crop by clean, mellow culture, and if practicable by mulching for winter as well as for summer.

Most of the cultivated sorts of the raspberry are varieties derived from three species of the genus *Rubus*. The Antwerps, and others resembling them, are varieties of *Rubus Ideus*, the European Garden raspberry, which is distinguished by the stems being mostly rather tall and nearly erect, beset more or less with straight slender prickles, many of which are

mere bristles; and the plants increase by suckers. Most of these are rather tender. The Blackcap raspberries are varieties of *Rubus occidentalis*, an American species, the stems of which are armed with hooked prickles, but not with bristles, and are recurved so as to reach and take root at the tips, which touch or are buried in the ground. A few sorts are varieties of *Rubus strigosus*, or Wild Red Raspberry, which has upright stems, copiously furnished with bristles. The canes increase by suckers, and are quite hardy. A few cultivated sorts appear to be hybrids between some of these species.

CLASSIFICATION.

- I. RUBUS IDEUS—*European Origin.*
 - 1. Red.
 - 2. Yellow.
- II. RUBUS OCCIDENTALIS—*American Blackcap Origin.*
 - 1. Black.
 - 2. Purple, red or yellow.
- III. RUBUS STRIGOSUS—*Native Wild Red Raspberry.*
 - 1. Red or purple.
 - 2. Yellow or orange.

VARIETIES.

SECTION I.—EUROPEAN SPECIES.

Red.

Belle de Fontenay.* Large, long conical; purplish-red, with a thin bloom; moderately firm, sub-acid, good. Canes stout, branching, suckering freely; hardy, and if kept clear of suckers, productive—bearing in autumn under favorable circumstances. French. Worthless in some localities.

Belle de Palau. Large, roundish-conical, regular; bright crimson; moderately firm, juicy, very good. Canes strong, upright, very productive; spines short, purple. Requires winter protection. French.

Clarke.* Large, roundish conical; light crimson, rather soft, juicy, sweet, high-flavored. Berries sometimes imperfect. Canes stout

and branching, leaves large. Hardy, and succeeds on light soils. Suckers very freely. Productive. Origin, New Haven, Conn. Fig. 766.

Fastolf.* Large, obtuse conical, approaching roundish; bright purplish-red; rather soft, high-flavored. Canes strong, nearly erect, branching, productive. English. Excellent for home use; too soft for distant market.



FIG. 766.—Clarke.

Fillbasket or Northumberland Fillbasket. Rather large, roundish; deep red; pleasant sub-acid, moderately good. Very bristly or spiny. English.

Franconia.* Large, obtuse conical; dark red; firm, with a rich sub-acid flavor. Canes strong, branching and spreading, moderately hardy, productive. A valuable market sort. French. *Naomi*

closely resembles Franconia, and by many is supposed to be identical.

French. (Vice-President French.) Medium or rather large; roundish, crimson; firm, sweet or mild, very good. Productive and valuable. Philadelphia, Dr. Brinckle.



FIG. 767.—Hudson River Antwerp.

Hudson River Antwerp.* Large, oblong conical; red, firm, with a very good flavor. Cultivated with great success in Ulster County on the Hudson, but rarely succeeds in other localities. Requires winter covering. Origin unknown, but supposed to have been imported. Distinct from Red Antwerp, or Old Red Antwerp, which has nearly round berries. Fig. 767.

Knevett's Giant.* Quite large, rounded conical; deep red; flesh

rather firm, adhering partly to the stalk. Canes strong, erect, spines few. Moderately hardy, productive. English.

Hornet. Quite large, ovate conical or roundish; firm, sub-acid, good. Canes strong, fruit-stems long. Productive. Fig. 768.

Large-Fruited Monthly. Medium or rather large, roundish; crimson; soft, sweet, juicy, of good quality. English.



FIG. 768.—Hornet.

Marvel of the Four Seasons. (*Merveille des Quatre Saisons*, October Red.) Medium, roundish-conical; bright red; rather soft, juicy, sweet, rich. Canes hardy, suckering profusely; spines or bristles short, purple. Under favorable circumstances bears till mid-autumn. French.

Meredeth Queen. Medium, red salmon, juicy. Canes vigorous, tender, suckers. Late.

Superlative. Large, conical, dull red. Canes strong, vigorous. Said to be hardy and productive.

Thompson's Early Prolific. Large, round-conical, red, firm, good; early, vigorous, productive.

Yellow or Orange.

Col. Wilder. Large, roundish-conical; yellowish-white or cream-colored, slightly translucent; good, rather soft. Canes strong, spines white. Philadelphia, Dr. Brinckle.

Golden Mayberry. Large, round; golden yellow, semi-transparent; hybrid of Luther Burbank. Canes long, strong, bushy.

Golden Queen. Medium, yellow, soft, moderately juicy, sweet. Canes vigorous, productive, prickly, hardy. Iowa.

Orange.* (*Brinckle's Orange*.) Fruit large, nearly conical; clear orange-yellow, soft, juicy, sweet, rich, of excellent quality. Canes strong, branched, nearly hardy, very productive. The best of the yellow raspberries. Philadelphia.

Vermont.* Large, pale yellow, downy, very soft, juicy, productive. Canes vigorous, prickly. Good. Iowa.

SECTION II.—AMERICAN BLACKCAPS.

Black.

American Blackcap. The common Blackcap, with its many variations, growing wild throughout the country, distinguished by its long recurved canes, and its regular, nearly round, or hemispherical berries, is the type of this division.

Davison's Thornless. Medium in size, resembling the American Blackcap, but a week earlier; sweeter, and with canes nearly free from prickles. New York.

Doolittle.* (Joslyn's Improved, Improved Blackcap.) Full medium in size, black, sweet; a large variety of the wild Black Raspberry. Ripens early. Canes strong, with numerous prickles, productive. Has been extensively cultivated for market in many of the States. Ontario County, N. Y.

Gregg. Large; black, with some bloom; firm, quality moderate. Rather late. A productive and popular variety. Largely planted for market. Origin, Indiana.

Hilborn. Large, black, firm, juicy, sweet, good. Canes vigorous, productive. Mid-season, hardy. Canada.

Hopkins. Full medium or large; black, with some bloom; rather soft, of excellent quality. Early. Growth strong; very productive. Missouri.

Kansas. Large, round, black, firm, moderately juicy, hardy.

Mammoth Cluster.* (McCormick, Large Miami.) Quite large, often four-fifths of an inch in diameter, flavor very good; canes strong, bearing very large crops—rather late. This is the most popular of the Blackcap raspberries, and in the catalogue of the American Pomological Society is recommended in twenty-eight States.

Mills No. 7. Large, firm, black, moderately juicy, sweet, quality good. Canes very vigorous, exceedingly productive, sometimes winter-kills. New York.

Mills No. 15. Medium, black, firm, juicy, sweet, very productive, not hardy. New York.

Nemaha. Large, black; productive; late, hardy; said to be a few days earlier than Gregg, almost identical.

Ohio. Medium in size; black with a moderate bloom; medium in quality. Canes unusually white. Profusely productive. Season medium. Bears long shipping. This is the most popular berry for drying. It has large seeds and shrinks less in consequence than any other sort.

Ohio Everbearing. Resembles the American Blackcap, except that it has the habit of fruiting in autumn.

- Older.** Large, round, black, firm, juicy, prolific, hardy. Late. Iowa.
- Ontario.** Large, nearly black, with thick whitish bloom, quality good. Rather early. Wayne County, N. Y.
- Palmer.*** Medium, black, firm, nearly sweet, early, hardy. A good market berry.
- Souhegan.** Rather large, black. Very hardy and productive. Valuable. Quite early. New Hampshire.

Purple, Red, or Yellow.

- Catawba.** Hardly medium, rather flat; purplish-red, with a thick stem; sub-acid. Canes rather tender, producing a second crop in autumn. Cutting down the whole stool in spring causes the canes to bear till late in autumn. Valuable only for the garden. Pennsylvania.
- Columbian.*** Large, purple, firm, moderately juicy, nearly sweet. Very prolific. Canes tall, vigorous. Resembles Shaffer's Colossal. New York. Mid-season.
- Ganargua.** Large, full and well rounded, reddish-purple, sub-acid, of good flavor. Canes very strong and vigorous, very prickly, bearing large crops, which ripen for several weeks. Ontario County, N. Y.
- Golden Cap.** Resembles the American Blackcap, except in the yellow color of its fruit. But little cultivated.
- Golden Thornless.** Quite large, dull yellow, firm, of moderate quality.
- Purple Cane.** Rather small; dark dull red; soft, sweet, good. Canes long and strong, recurved. Resembles the Blackcaps in rooting at the tips of the canes, but differing in the character of the fruit. An old and popular variety, becoming superseded.
- Seneca Blackcap.*** Rather large, dark shining purplish-black, very good in quality. Season medium. Canes vigorous and productive. One of the best of the Blackcaps.
- Shaffer (or Shaffer's Colossal.)** Very large; dull purple; soft, rather acid, moderate in flavor. Canes very large and tall. Quite productive.

SECTION III.—NATIVE RED RASPBERRY.

Red or Purple.

- Allen.** Two or three sorts with this name were disseminated by L. F. Allen, of Black Rock, N. Y. The canes are strong, erect, very hardy, and sucker profusely. When kept free from suckers, they have produced good crops in some localities, of medium-sized, red, pleasant fruit.
- Brandywine.** Rather large, bright scarlet, handsome; flesh firm, of

- good quality. A very popular and profitable market sort in New Jersey and elsewhere. Canes low, and of a stout dwarf habit.
- Cuthbert.*** Medium or large; scarlet-crimson; firm, juicy, very good. Canes vigorous, productive, rather hardy. One of the most popular and valuable. Riverdale, N. Y. Suckers freely.
- Early Prolific.** Medium, pale red, firm, juicy. Canes slender, few prickles, bright dark red, upright, vigorous, good.
- Erie.** (Gladstone). Medium, red-crimson, soft juicy, nearly sweet. Canes vigorous; second crop in autumn. Ohio.
- Herstine.*** Large, oblong-conic; bright crimson; flesh rather soft, quality very good. Canes strong, light green, spines few. Very productive. Philadelphia.
- Kirtland.** Medium, nearly round, red, moderate firm, sweet. Canes erect, nearly smooth, becoming pale red, suckering freely, hardy, productive, early. Fails in some localities.
- London.*** Large, roundish-conical, red, firm, good. Wisconsin. S. Productive, hardy, good shipper.
- Marlboro'.** Large, roundish-conical, quite firm, red, of moderate quality. Vigorous, productive, and hardy. Quite early. New; promising for market.
- Montclair.** Above medium, roundish; dark red; firm, of good quality. Suckers quite moderately. New Jersey. The variety named "Superb" resembles Montclair, but is more acid, crumbly, and the plant suckers more freely. Both are valuable.
- New Rochelle.*** Rather large, obtuse-conical; dark or dull red; firm, sub-acid, moderately good. Valuable for canning. Canes short-jointed and branched. Very productive. New Rochelle, N. Y.
- Olathe.** (Stagman No. 5.) Large, red, firm, juicy, productive. Canes slender, upright, vigorous.
- Pearl.** (Susqueco.) Medium, bright red, firm, of good quality. Canes low and of a dwarf habit, resembling those of Brandywine, but the foliage comes out a week later in spring. A popular market sort near Philadelphia.
- Philadelphia.*** Medium in size, nearly round, dark red, moderately firm, sub-acid, of good but not rich flavor. Canes erect, branching, reddish-purple, with a few small spines, suckering moderately, bearing profuse crops. Hardy.
- Reliance.** Medium, roundish; dark red; firm, quality good. Productive and very hardy. Season medium. An improved Philadelphia. New Jersey.
- Royal Church.** Large, round, red, moderately juicy, crumbly. Canes vigorous. Late. Hardy.
- Talbot.** Medium, red, soft, juicy, sub-acid; very good. Canes vigorous.

Turner. Full medium, roundish-conical; bright red; rather soft, sweet, pleasant. Canes vigorous. Very hardy and productive, suckering freely. Succeeds in nearly all localities. Origin, Illinois.

Yellow or Orange.

Caroline.* Medium, roundish-conical; salmon; soft, medium in quality. Handsome and productive. It is propagated by tips and suckers. Origin, New York.

Rubus Flavus. Medium, yellow berries. Canes very strong and high. A rank grower in Florida, where it is said to be the only raspberry which will thrive in that climate. Ripens in May.

CHAPTER XXXIII.

THE STRAWBERRY.

IN the cultivation of this early and delicious fruit, the requisites for success are chiefly:

1. A good, deep, rich soil.
2. Clean cultivation between the rows.
3. A renewal by planting as often as the vigor of the plants declines.
4. Selection of suitable varieties.

Soil.—Any deep, rich soil, which will afford fine crops of corn and potatoes, is well adapted to the cultivation of the strawberry. To be uniformly productive, it must be deeply trenched, either by the spade or by double ploughing, and well enriched with manure. Fine crops, it is true, may be obtained without trenching, but not in such excellence, profusion, or certainty, in all seasons. It rarely but sometimes happens that the soil is made too rich. The usual error is the reverse.

Strawberries are increased by rooted runners, which are usually thrown out from the plants soon after bearing, and they root late in summer and in autumn. These new plants succeed best if set out the following spring; but strong plants may be set out in autumn in light soils, or in heavier soils if the roots are carefully spread out and the earth trodden compactly.

Transplanting.—As far north as Albany, N. Y., setting out strawberries, either from well-rooted runners, or preferably from pot-plants, is now usually performed during August or early September. The plants will immediately take root, become well established before winter, and bear a good crop the following season. As the weather is often quite dry and warm at this time, precaution must be used to prevent the plants from perishing by drought. All the leaves, except the

small central ones, should be cut off, the roots kept wet and carefully spread out when set, as just described. The earth should be well settled about them with water, and mellow earth then drawn over the surface. A covering of fine manure, an inch or two in thickness, is then spread on the ground to preserve the moisture. It is only in cases of severe drought



FIG. 769.



FIG. 770.

that further watering is required. But when given it should be copious and repeated daily until the fresh leaves begin to expand. By this treatment scarcely a plant will be lost. If the work is done well they will bear a good crop the following season, and a heavy one the next. The well-rooted runners should be taken up, so as to secure all the fibres, lifting the roots out with a spade and shaking the earth carefully from them; if pulled severely by the hand the roots will be torn off. The older and dead leaves should be cut off from the plants, and the roots trimmed to about two and a half inches long. For ordinary field culture they may be set out with a dibble



FIG. 771.

(Fig. 769), care having been previously taken to immerse the roots in mud to prevent drying. But for more finished or for garden culture, it is better to spread the roots out like the frame of an umbrella (Fig. 770), and set them in a hole broad enough, with a small mound in the centre, on which the spread roots rest and form a cap, as shown in Fig. 771.

Mr. F. Richards, of Freeport, N. Y., has invented an instrument for transplanting strawberries, which does the work ex-

peditionously and well. Fig. 772 represents the "excavator," Fig. 773 the "transplanter," and Fig. 774 the "ejector."

Treading the earth firmly about the plants when set lessens the liability to winter-killing.

A spontaneous renewal of plants may be effected by allowing runners to fill up the spaces between the rows, and then spading in the old rows. By thus filling alternate spaces in two successive years, an annual supply of fruit is afforded. This method of renewal has not been generally adopted.

Mulching among the plants, to keep the berries from becoming soiled with earth, should not be omitted. Straw answers a good purpose, and is more easily and neatly applied, if chopped short, say two or three inches. Rye straw, threshed by hand, will lie more smoothly than any other long straw. Applied in autumn, straw will protect from winter-killing, and may be renewed or retained in spring.

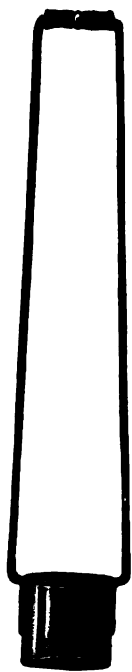


FIG. 772.



FIG. 774.



FIG. 773.

CULTIVATION OF STRAWBERRIES.—Clean cultivation is a most essential requisite. On a large scale, it may be very cheaply accomplished by a horse and cultivator, the rows being about three feet apart, and the plants a foot to a foot and a half in the rows. The treatment may be varied with circumstances, provided the great leading requisite is constantly kept in view, namely, *to allow no weeds to get above the surface*. This is the great cardinal essential, which must not be departed from. After the plantation is set out in clean, well-prepared soil, stir the ground often enough to destroy the sprouting weeds before they get to the light. The work may be then done with less than a tenth of the labor required after the weeds are several inches high; and all the labor of this fre-

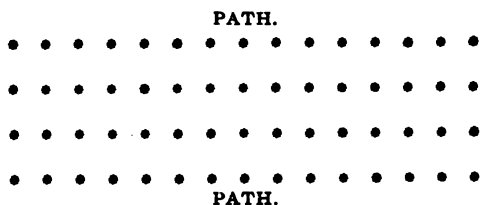
quent stirring is more than repaid by the increased growth and vigor given to the plants, to say nothing about the weeds. If the plantation is small, the work may be done with a garden rake; if large, with a one-horse cultivator, or, perhaps better, with a fine-toothed one-horse harrow. If this is attended to thoroughly through autumn, the plantation may be mulched at the beginning of winter with straw. It will be better, especially for heavy soils, to remove the mulching in spring and mellow the surface one or more times before the plants blossom. This may be done by raking the mulch into every alternate row, and then, after the denuded spaces are stirred, to rake it back again and do the other rows. The mulch being replaced by flowering-time, the berries will be kept clean. Some cultivators, who have small plantations, do not disturb the mulch in spring, but loosen the soil through it with a pronged hoe—but whatever course is adopted, see that the weeds do not grow.

Strawberry Runners.—The formation of runners exhausts and checks the plants more than a dense mass of weeds. If you wish them to become strong, and bear large, excellent fruit, and plenty of it, keep the runners cut off, and repeat the operation once a week through the summer. Begin the work as soon as the plants *begin* to form runners, and not after they have sent them out in profusion—which is usually immediately after bearing-time. If intended for increase, and to form new buds, a small portion of the bed may be permitted to run and root. Some varieties will often bear profusely for a single season, even when the plants run thickly together; others, and more particularly the larger sorts, must be cleared of runners and kept well cultivated, or they will bear small crops.

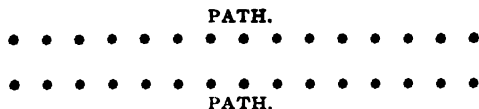
Strawberries are injured in winter by severe winds, and by the successive heaving of freezing and thawing. They will always start earlier and fresher when covered. Sometimes snow will be an ample protection, but it must not be relied on. A thin coating of straw, evergreen boughs, or even corn-stalks, will shield and protect the surface of the ground, but it should not be applied till winter is close at hand, and after the ground is frozen hard is not too late. Do not forget to loosen up this mulching very early the next spring, and stir and mellow the soil.

Early Strawberries.—The following method has been successfully tried in some places: Cover a good, well-managed, clean bed of strawberries, the runners of which have been kept off, so as to form large, vigorous stools, with dry forest leaves early in winter, three or four inches thick. Remove these leaves in February in the Middle States, and in March in the North, and place over the plants a frame with sash. Bank the sides with leaves, and cover the sash in severe weather. The plants will start early, and give ripe fruit at the usual blooming time. Airing and water must not be neglected.

For garden culture it is most convenient to provide beds about five and a half feet wide, with paths two feet wide between them. Four rows are then set in each bed, a foot and a half apart, and the outer six inches from the edges of the bed, as shown in this diagram:



The plants may be about a foot apart in the rows. This arrangement allows the picking of the berries from the paths on each side without treading on the beds, the distance to the second or inner rows being only two feet. If the ground is more limited, beds two feet and a half wide may be made and but two rows planted, as in the diagram below:



In setting out strawberry-plants, the following rules may be observed: 1. Use well-rooted one-year plants. 2. Make the rows straight and parallel by a stretched cord. 3. Take up in a moist time if practicable. 4. In a dry time water the plants well before taking up. 5. Dip the roots in thin mud before

setting. 6. If watered after setting, finish by drawing on mellow surface earth, and avoid covering the crown. 7. Plants set at midsummer should have the surface about them covered with fine manure an inch deep, to keep it moist and prevent crusting.

SELECTION OF VARIETIES.—Independently of fine quality, the selection of suitable varieties is of great importance. Some sorts, celebrated and highly recommended, will not yield a tenth part of the crop afforded by others. The most productive, among which the Wilson is conspicuous, have yielded at the rate of one hundred, and often two hundred bushels per acre; the ground, at the period of ripening, glowing with the dense red clusters, which nearly cover the surface; while on some foreign varieties the fruit is so thinly scattered and imperfect that whole square feet are destitute of fine specimens. It must constantly be remembered that no fruit is so influenced by soil and other conditions as the strawberry. Varieties which in our locality are nearly everything that could be desired are almost valueless in others. In all cases where large numbers of plants are to be set out, the experience of the State Agricultural Experiment Station should be availed of.

STAMINATE AND PISTILLATE SORTS.

As the productive qualities of strawberries depend so essentially on the presence of the *stamens* and *pistils*, some attention to this part of the subject becomes indispensable to their successful culture.

Modern cultivators divide all strawberries into two distinct classes, one being termed *staminate* (or "male"), in which the stamens are fully developed and possess the power of fertilizing the germ; and the other being termed *pistillate* (or "female"), in which the stamens are abortive, or so small and imperfectly developed that they fail to accomplish fertilization. In this work it is deemed advisable to designate the two as "perfect" and "imperfect." Figs 775 and 776 represent the usual appearance of these two kinds of flowers; and Figs. 777 and 778 magnified portions of the same, Fig. 778 exhibiting a part of the flower of the Large Early Scarlet, and Fig.

777 the same of Hovey's Seedling; *a* being the stamens, and *b* the pistils. By the use of a microscope it will be found that the former is abundantly supplied with pollen or fertilizing dust, while the latter is nearly or totally destitute. Hence

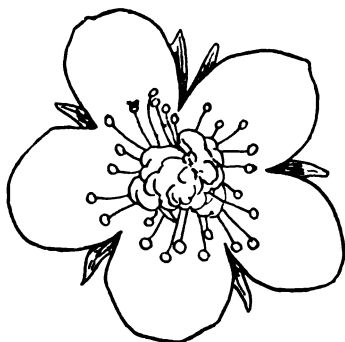


FIG. 775.—Perfect Flower.

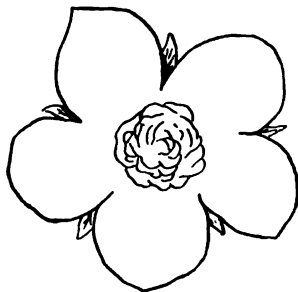


FIG. 776.—Imperfect Flower.

Hovey's Seedling, or any other pistillate variety, can never, or but very imperfectly, fertilize its own flowers, and the impregnation must be derived from a staminate sort.



FIG. 777.



FIG. 778.

In planting strawberry beds, it is important, therefore, to know the character of the flowers. Nothing is easier than to distinguish the two when in blossom. This distinction is given in the *arrangement of varieties* which follows. About one-quarter staminate are usually regarded as abundant for fertilizing a bed of pistillates. To prevent intermixture of the two sorts by runners, they may be planted in alternate strips,

as indicated by the following diagram, S representing staminate and P pistillate varieties:

P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S

In selecting two varieties for this purpose, perfect fertilization requires that their season of flowering should be nearly at the same time. Hence early and late flowering sorts will not succeed well together for this purpose. Nearly all sorts most commonly cultivated at the present time are staminate, and do not require this arrangement of beds for fertilization.

VARIETIES.

ARRANGEMENT.

CLASS I.—SCARLET AND PINE STRAWBERRIES.

(*Fragaria Virginiana*, *Fragaria grandiflora*.)

Scarlet strawberries have small flowers; leaves rather long, thin, and light green, sharply serrate; fruit bright color, acid or subacid, seed deeply sunk. Pine strawberries are characterized by rather large flowers, leaves broad, dark green, sometimes obtuse; fruit large, not acid, rather smooth, seeds little sunk. These two sorts have been much hybridized and crossed, until it is now difficult to assign many varieties to either separately.

Section I.—Flowers Perfect.

Section II.—Flowers Imperfect.

CLASS II.—ALPINE AND WOOD STRAWBERRIES.

(*Fragaria vesca*.)

Flowers rather small, perfect; leaves small, thin, light green; fruit small, sweet, parting freely from the calyx.

CLASS III.—HAUTOIS STRAWBERRIES.

(Fragaria elatior.)

Leaves large, pale green, on tall stalks; fruit-stalk tall and erect; fruit dull purplish.

CLASS IV.—CHILI STRAWBERRIES.

(Fragaria Chilensis.)

Leaves very hairy, thick, obtusely serrate; fruit very large, pale, insipid. Tender.

CLASS V.—GREEN STRAWBERRIES.

Leaves light green, plaited; flesh solid. Of little value.

Of classes II., III., IV., and V. but few sorts are in cultivation, and as they are of little value no description of varieties will be given.

VARIETIES OF SCARLET AND PINE STRAWBERRIES.

It is not intended that the following list should be considered to embrace all the varieties of strawberries which have been introduced in the United States. The ease with which new sorts may be produced has given rise to an almost endless number.

Those only which have become standards of the older sorts, and the most promising of the newer ones are here described. It is repeated that no other fruit is so influenced in all its characteristics by soil, climate, and cultivation as the strawberry.

Section 1. Flowers Perfect.

Aroma. Large, irregular conical; light red, moderately firm; not very productive; berries uniform in size. A late variety from Kansas.

Beder Wood.* (Racster.) Medium roundish, conical, rather soft, sweet, light vermilion. Prolific; a good pollinizer; does well South. Early.

Belle. (Lady Finger.) Very large, long round, necked; glossy red or crimson; flesh firm, reddish-white. Vigorous, hardy, productive.

Beverly. Medium, good form and color; plants healthy and fairly productive; deep crimson; sub-acid. Berries become smaller toward the last. Resembles Morris' Prolific.

Bidwell. Medium to large, long conical, often uneven; bright crimson; flesh firm; rich, sub-acid. Early. Requires rich soil and cutting of runners. Light bearer. Fails in many localities, valuable in others. Michigan.

Bomba. Large, dark crimson, rather soft. Good for home use. Mid-season.

Boston Pine. (Bartlett.) Large, roundish, very slightly conical; deep red; flesh pale scarlet, solid, rich-flavored. Hardy. Often productive. Needs a fertile soil, and cultivation in "hills" or rows. Early. Fails entirely when allowed to cover the bed.

Brandywine.* Medium to large, regular conical, sometimes irregular; dark scarlet; firm, somewhat acid. Not very productive; runners very numerous. Good market berry. Does best in clay soil. Pennsylvania.

Charles Downing.* Rather large, ovate-conical, regular; color deep scarlet; flesh firm, juicy, rich. Plant vigorous and productive. Valuable in nearly all localities. Raised by J. S. Downer, Kentucky. Old.

Crawford.* Large, long conical; dark glossy red; firm, sub-acid. Productive. Good market berry.

Cumberland.* (Cumberland Triumph.) Large, broad conical, very regular; light red; rather soft; of a mild and very good quality. A vigorous grower and good bearer. Mid-season. Carlisle, Pa.

Cyclone. Medium, regular conical; size uniform; scarlet; moderately firm; fair quality; foliage vigorous, but not very abundant. Moderately productive.

Forest Rose. Medium or large, rounded conical; scarlet; moderately firm, rich, and rather sweet. Its value is nearly destroyed by the failure of the foliage in many localities. Ohio.

Gandy.* (Gandy's Prize, First Season.) Large, regular conical; bright glossy crimson; firm; fine flavor; vigorous, prolific. A fine late sort. Good shipper.

Glendale. Rather large, long conical, regular; light red, firm, acid; flavor moderate or poor. Late. Profitable for market in many places.

Greenville. Large, obtuse conical; glossy crimson; flesh reddish. Vigorous, productive. Mid-season to late.

Hoffman. Medium, conical, crimson, hard. Will ship almost any distance, but no value otherwise.

James Vick. Medium, regular; sprightly, very good. Profusely productive. Requires rich culture. Missouri.

Jessie.* Very large, often wedge-shaped; bright red; sweet. Requires careful cultivation.

Jucunda.* Large, conical, rarely coxcombed; glossy, brilliant scarlet; seeds prominent; flesh white, with pale salmon centre, firm, juicy; of moderate quality—often poor. A profuse bearer on some soils, and valuable for market, bearing long conveyance. Plant rather tender. Late. Old.

Jucunda Improved.* Large, regular conical, bright crimson, firm. Vigorous, prolific. A good berry.

Lader. Large, obtuse conical; firm; good. Early. Does best in clay soil.

Lennig's White. Large, ovate conical; whitish tinged with red; flesh soft, tender, juicy, with a rich pineapple flavor. Delicious in quality, but a poor bearer. Pennsylvania. Old.

Logan. Large, round conical; scarlet; moderately firm. Early to mid-season.

Lovett.* (Lovett's Early.) Large, round, flattened conical, crimson; firm, sub-acid. Early to mid-season. A good pollinizer.

Marshall.* Large, round conical; dark glossy crimson, running into the flesh; firm, rich; strong grower. Moderately productive; needs high cultivation in clay soil. Mid-season.

Mary.* Very large, long irregular conical; dark crimson; acid, rich. Productive. Keeps long on plants. Mid-season to late.

Meek's Early. Small, round, dark red; flesh red, sub-acid. Early. Needs clay soil.

Mitchell's Early.* (Osceola, Ella.) Small, conical; dull vermilion, soft. Vigorous, prolific. Very early.

Miner.* (Miner's Prolific, Miner's Great Prolific.) Rather large, roundish conical, slightly uneven; dark crimson; moderately firm, of fair quality. Rather late. Plant hardy, vigorous, productive; valuable. Best with hill culture. New Jersey.

Mrs. Cleveland. Large, long conical, irregular; bright vermilion; rather soft; fine flavor. Productive. Good home sort.

Muskingum.* Large, obtuse conical, sometimes corkscrewed; bright glossy red; flesh red. Prolific under good cultivation. Mid-season to late. A good variety to plant with Bubach.

Nicanor.* Medium, ovate, conical, uniform and regular; scarlet; flesh rather firm, rich and of fine quality. Plant productive and hardy; valuable for its earliness. Raised by Ellwanger & Barry, Rochester, N. Y. Old.

Parker Earle.* Medium, flattened conical; scarlet, slightly necked; flesh red, sub-acid. Strong plants; very productive. Season late. Needs rich soil.

President Wilder.* Large, ovate-conical, regular; bright scarlet; flesh firm, sweet, rich. Often quite productive. Dorchester, Mass. A European variety known as President Wilder is distinguished from this by the long neck of the fruit. Old.

Princess.* Very large, roundish; light crimson; good flavor. Vigorous, productive. Minnesota.

Princeton Chief. Medium roundish; dark red; berries on stout stalks; very sweet. Vigorous, productive. Mid-season.

Rio. (Thompson's No. 9.) Medium, irregular, ovate; bright red, or scarlet; quality fair. Very early.

Seth Boyden.* (Boyden's No. 30.) Very large, roundish conical, regular, often with a short neck; bright crimson; rather soft on the surface; juicy, rich, sub-acid. Plant vigorous and productive. Newark, N. J. Old.

Sharpless.* Very large, often irregular and coxcombed or flat conical; dark scarlet; firm, rich, very good. Season medium. Widely known for its great size. Fails in some localities. Pennsylvania.

Shuckless. (Mt. Vernon.) Large, obtuse conical; light crimson; quality fair; parts from the calyx in picking. Mid-season.

Triomphe de Gand.* Quite large (often two inches longest diameter under good cultivation), sometimes irregularly roundish, more frequently much coxcombed; crimson; flesh rather firm, with a mild, sweet, very good flavor. Plant vigorous, hardy, and moderately productive—requiring good cultivation and the removal of runners. Belgian. Old.

Warfield. Medium, round conical; dark crimson; flesh firm, red, mild acid. Claimed to be very productive. Good shipper and canner.

Wilson.* (Wilson's Albany, Albany Seedling.) Medium to small, broadly conic, pointed; deep crimson; flesh crimson, firm, brisk acid, becoming rich and agreeable when fully ripe. Exceedingly productive and hardy, and succeeds well as a market sort at the North, South, and West. Although an old variety, it is still one of the popular standard sorts. It is a good pollinizer for imperfect plants. Old.

Wolverton.* Large, regular, round conical, bright crimson; flavor good. Vigorous, productive. Mid-season to late. Canada.

Yale. Medium, round conical, dark crimson, running into the flesh; flavor good. Requires good cultivation. Very late.

Section II. Flowers Imperfect.

Barton's Eclipse. Very large, round conical; glossy dark red; medium fine. Vigorous, productive.

Bubach.* (No. 5). Large, round conical, sometimes wedge-shaped, dark scarlet, sweet; quality fair; moderately firm, hollow. A handsome berry. Requires good cultivation. Early to mid-season. Good nearby-market berry.

Burr's New Pine. Medium or large, an inch to an inch and a fourth in diameter, roundish conical, smooth, even, and regular; seeds scarcely sunk; color pale red; flesh whitish pink, very tender, flavor fine. Prolific and with perfect berries. Formerly very popular; now nearly superseded. Old.

Crescent.* Medium or large, roundish conical; bright scarlet; moderately good, rather soft. A profuse bearer. Rich culture improves its quality, and sometimes changes it to a staminate. Connecticut.

Glen Mary.* Very large, heart-shaped, like Sharpless, of which it is probably a seedling.

Great Pacific.* Large, irregular, lobed; dark red; firm. Good market berry. Early. South.

Green Prolific.* Large, roundish; orange scarlet. Good, rather acid; valuable. A thrifty grower, productive. New Jersey.

Haverland. Medium, long conical; light scarlet; large trusses. Productive. Not very good.

Hovey's Seedling.* Quite large, roundish oval, approaching conical; color deep shining scarlet; seeds slightly sunk; firm, rather rich, good. Very large, showy, productive, and hence fine for market. Season medium. With high culture it has been made very productive. Well known and popular, but partially fails in many localities. Old.

Jersey Queen. Large, roundish oblate; crimson, handsome; firm. Late. Usually a moderate bearer. New Jersey.

Jewell.* Large, flat conical; crimson-scarlet; firm, solid, good. Does best in heavy rich soil.

Shuster's Gem.* Medium, globular; scarlet; soft, sweet, good. Plants vigorous, productive. Mid-season.

Timbrell.* Large, globular; dark crimson; firm, rich, juicy. Plants vigorous. Very late. An excellent all-round berry.

CHAPTER XXXIV.

WILD AND UNCLASSIFIED FRUITS.

BUFFALO BERRY.

THE Buffalo Berry (*Shepherdia argentea*), as its name indicates, is a native of the far West. It is a rather straggling, open shrub of eight to twelve feet, with alternate ovate leaves, silvery on both sides. The fruit, usually bright red (there is a yellow variety), one-quarter inch in diameter, thickly lines the branches and makes it quite ornamental. The berries are not edible until after hard freezing, and then have a brisk, pleasant sub-acid flavor. They are said to be good for jams and sauces. They will hang on the bushes all winter, if the birds permit.

ELEAGNUS LONGIPES.

This fruit is a native of Japan, and when first introduced into this country was called Goumi. The shrub grows to four or five feet in height and blooms in May. Its flowers are small, greenish-yellow, and not conspicuous; it sets a large quantity of berries thickly strung along the branches, smooth or ribbed, oval and dark green, until ripe in July and August, when they change to a beautiful bright glossy crimson profusely dotted with golden yellow spots—one of the most beautiful of berries. Until fully matured they are decidedly astringent, but when ripe their flavor is spicy and good. Mr. William Falconer says a very good jelly may be made from them.

The bush is very ornamental at all times, and when covered with berries is uncommonly so. Unfortunately the birds seem



FIG. 779.—Buffalo Berry.



are found usually in clearings on hills, all over the United States north of Georgia and Alabama. The gathering of this crop annually furnishes employment to large numbers of men, women, and children of the poorer class, from whom it is purchased by farmers and others, who daily meet the pickers at an appointed spot, and by them the berries are boxed and forwarded to market.

Some attempts have been made to cultivate this berry.



FIG. 781.—Clump of Black Huckleberries.

Joseph Meehan says that if cut down one-half and transplanted to the garden in the spring few will die, and they will bear the second year, with promise of good crops thereafter. It is further stated by others that with all the varieties the size of the fruit increases under good cultivation.

The growing of the huckleberry is one of the few as yet undeveloped fields of horticulture, and seems to promise satisfactory returns to the patient investigator.

While there are a number of species belonging to the two genera mentioned, the following only are worth consideration as edible.

VARIETIES.

Bilberry.* (*Vaccinium cespitosum*.) Grows on a very low bush three to six inches high, in sandy, hilly ground; berry large, light blue, round; good.

Black Huckleberry. (*Gaylussacia resinosa*.) Grows on dry sandy, rocky, hilly woods and clearings, one to three feet high. There are a number of varieties, some globular, some pear-shaped; jet black, glossy, seeds very large; not very good. The common huckleberry of the markets.

Canada Blueberry. (*V. Canadensis*.) Grows in dry sandy and rocky soil; berries round, blue, good.

Highbush Blueberry.* (Dangleberry. *G. frondosa*.) Grows in open places by the woods, along fences, in damp, sandy soil, three to six feet high; berries roundish-oblate, large, dark blue; seeds small; good.

Highbush Huckleberry. (*V. corymbosum*.) Grows in wet or swampy ground five to fifteen feet high; berry good size, blue or black; flavor sub-acid.

Low Blueberry.* (*V. Pennsylvanicum*.) Grows six to fifteen inches high in sandy soil; very large, light blue; sweet and good.

JUNE BERRY.

Of late years nurserymen have been advertising this as a valuable promising fruit. The sort most commonly known is a tree growing from ten to thirty or more feet high (*Amelanchier Canadensis*) usually called Service-tree or May cherry. The improved dwarf June berry is simply the wild variety *A. alnifolia* or *A. rotundifolia*, the former being indigenous to the North and West, and the latter to North Carolina. There are also still other kinds. The shrubby or dwarf June berries are hard-wooded plants, which produce roots and stems but slowly. These are not difficult to transplant, and if left undisturbed will soon produce quantities of dark purple berries about the size of large currants. The flowers appear before the leaves in long, rather loose clusters, and are quite large and clear white. As ornamental shrubbery they are worthy

a deep creamy yellow, very soft, a little gritty, very **sweet**. Embedded in this flesh are from two to six or eight **large** glossy black seeds.

While a most luxuriant grower and profuse bearer in its native soil, it is not hardy north of New York, and even **there** it is often winter-killed. It is nevertheless an ornamental **tree** for the lawn or garden, and well worth cultivating for **this**



FIG. 784.—Paw-Paw.
(Reduced one-half in diameter.)

merit as well as for its curious fruit, which is much liked by some.

The young trees can be obtained of nurserymen. The paw-paw is diœcious, and if fruit is desired it must always be stipulated that the stock purchased shall have borne fruit. The necessity of transplanting trees of such age and size enhances the difficulty of successfully establishing them. In the towns along the Ohio and Mississippi and their tributaries, in the fall of the year, the paw-paw is plentifully exposed for sale, but as it is too soft for transportation it is never seen far from the places where it grows.

Part Three.

SUBTROPICAL FRUITS

BY

E. H. HART

FEDERAL POINT, FLORIDA

CHAPTER XXXV.

CITRUS FRUITS.

THE ORANGE.

THE citrus-tree is supposed to have originally travelled from China to India, and thence gradually spread over the world to all countries having a climate sufficiently mild for its growth. The citron was known on the shores of the Mediterranean long before the sweet orange, and some scriptural allusions to the apple are supposed to refer to it. The Seville orange, or bigarrade, is reported to have been brought from the East by the Moors, who established large plantations of it about Seville in Spain; hence the name. From Spain this orange was brought to Florida by the early Spanish settlers, and the Indians, becoming very fond of it, carried quantities about with them on their canoe excursions to be eaten at their camps on the shores of the numerous streams of that well-watered country. The seeds, dropping upon the ground, soon germinated, and from them sprang the famous sour-orange groves, which in time became so vast and numerous as to lead many to believe the sour orange an indigenous product.

In Florida all sweet oranges were formerly called China oranges, to distinguish them from the Sevilles, and perhaps also in allusion to the country of their origin. Of late great attention has been paid to improvement of quality by selection, cross-fertilization, and scientific cultivation, and when the efforts in these directions shall equal those expended upon the fruits of temperate climes, a greater demand and higher appreciation will follow. The renaissance of the industry in Florida at the close of the civil war, combined with the popular estimation of the fruit grown in that peninsula, resulted in an increase of production in twenty-five years, from almost nothing up to about five million boxes per annum.

Under favorable conditions the orange-tree lives and continues fruitful to a great age. Its tenacity of life is wonderful. Trunks of large trees, after lying for weeks in the hold of a vessel as ballast, have struck root and renewed their lives when planted out and cared for. Others killed to the ground by fire or frost, and showing no signs of life for a year or

more, have at length sprouted and regained their former size. Unless actually diseased, there would seem to be hardly any limit to their recuperative power. Trees that had remained stationary for many years in the shade of crowded thickets, or stunted and dwarfed by aggressive grass and weeds, when removed to a congenial spot and cared for have immediately responded by growing off apace.

Evolution of the Orange.

The orange, originally a berry about the size of a marble, bitter and full of seeds, has been brought to its present astonishing development in size and flavor by the patient efforts of cultivators from the most remote times. The different types and varieties are the result of careful selection of seeds from fruit possessing the qualities most desired, and many variations have come from crossings with the lime and citron. Climate and soil have also exercised a powerful influence, after a term of years changing a variety so much as to render difficult its identification with the original. When various kinds of citrus are intermingled in one grove, distinguishing characteristics are sometimes completely wiped out. In extreme cases almost the whole crop on a tree of an elongated variety has become spherical or even flattened, and *vice versa*; navel oranges lost their special mark, and the navel seal appeared on nearly all the fruit of a China-orange tree. Navel oranges, properly seedless, have acquired seeds from the pollen of adjoining seedy varieties; also what appeared to be oranges have been found on lemon-trees and the reverse. Although these changes may not be sufficiently common to forbid the intermingling of different trees in a commercial grove, yet they are common enough to prove how easily and rapidly changes in types and varieties may be brought about; the necessity of care in the selection of seed; and also what some botanists have denied, namely, that the influence of pollination appears directly in the flesh of the fruit instead of affecting merely the seed. When quick results in crossing are desired, it may be remembered that the influence of strange pollen deposited upon the stigma will also affect for a short time several buds behind and under the blossom, and before this influence ceases these

buds may be transferred to another tree, grown, and fruited in a year or two. If seeds of the hybrid fruit be planted, buds from the young seedling when in its fourth or fifth leaf may be skilfully inserted into the sprout of a bearing tree and fruited in the same space of time.

That the bud influences the stock is proved by the more rapid expansion of the latter, after being worked with a faster-growing variety, as when a lemon is set into a sour orange, and also by the appearance below the union, in some rare instances, of adventitious growths of the same kind as the inserted bud. The writer has a large lemon-tree, worked on a sour orange, a foot above the ground and killed down by the late freeze. From a large side root of this sour-orange stock, about two feet distant from the trunk, are growing a couple of vigorous lemon-sprouts, showing the subtle and potent influence of the dominant top. The orange is also improved by double working, as, for instance, when a lemon is grown upon a sour stock and budded one or more times with an orange. Each successive change assists in refinement of flavor and elimination of seed and thorn. Some of these things may be deemed heresies, and possibly they are as applied to less tractable subjects than the citrus, certainly one of the most remarkably docile of fruit-trees.

PROPAGATION.

Seeds.—The orange is usually increased by seeds, which should be planted an inch deep, and about an inch apart, soon after removal from the fruit, and before they become too dry to germinate. If the seed cannot be planted at once, it may be mixed with moist sand, which will preserve its vitality for a long time, provided it be kept cool enough not to sprout. The young plants may be started in boxes filled with moderately rich earth, or in beds in open ground, covering the seeds with loose or sifted soil, which should not be allowed to become dry or crusted over. Shelter from the scorching beams of the sun in the hottest weather, and also from frosts, by screens of coarse cloth or lattice-work, with a liberal but not excessive supply of water, is necessary after they begin to grow. Moles may be kept from the seed-beds by an enclosure

